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Treasure in Your Trash

A Handbook for Local Recycling Programs

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15 1985
University of Massachusetts

Spring 1982

The Newton Waltham Recycling Project
and
Metropolitan Area Planning Council

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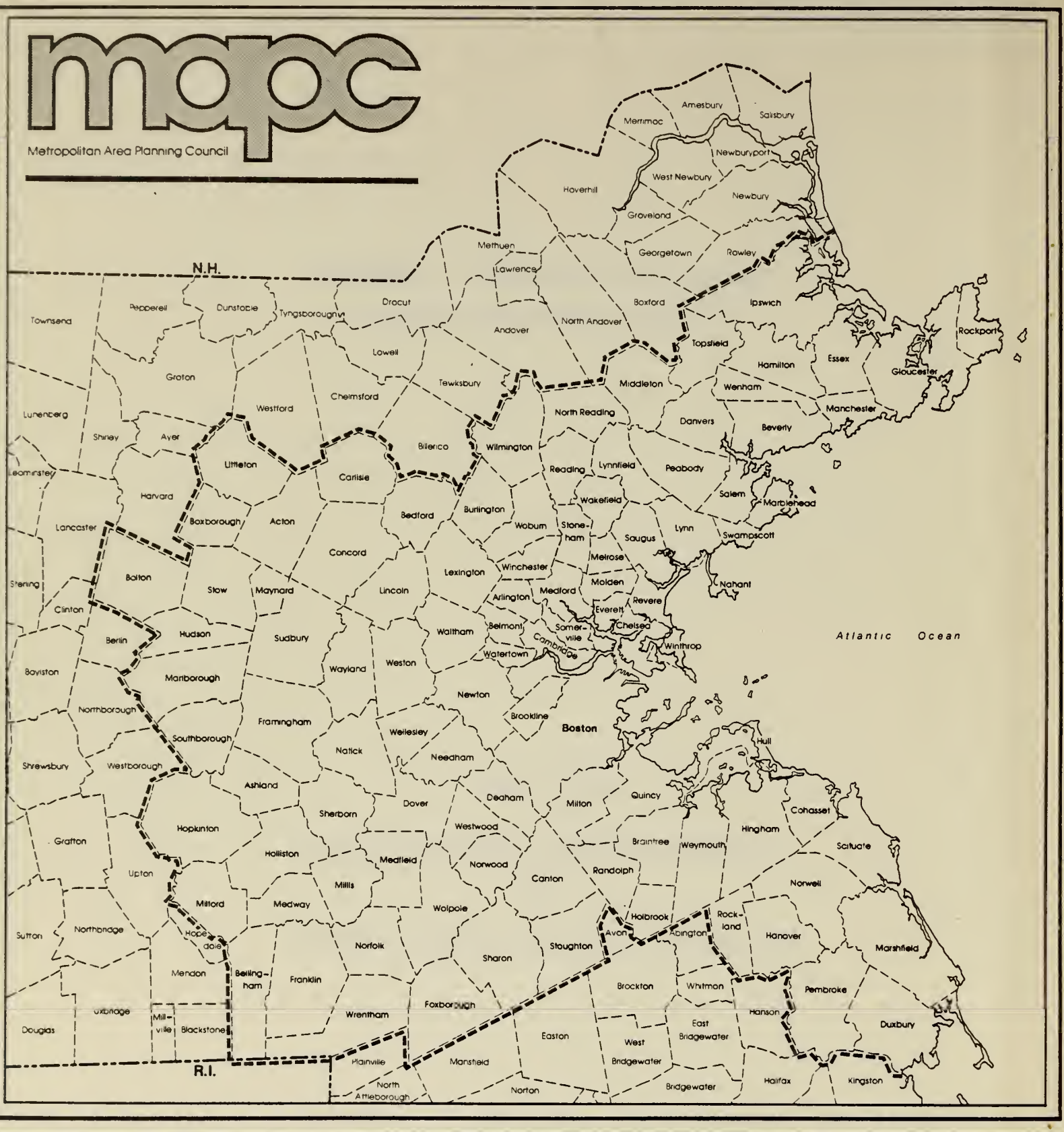
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West Bridgewater
Easton
Mainville
Mansfield
North Attleborough
Norton
Halifax
Kingston
Bridgewater
4 2 0 4 8 12
Scale in Miles
NORTH
MAPC boundary
Drawn: September, 1978.

ABOUT THIS REPORT

This report was prepared as part of a 1980 Incentive Grant from the Metropolitan Area Planning Council to the cities of Newton and Waltham. The Metropolitan Area Planning Council is the officially designated regional-planning agency for 101 cities and towns in the Boston metropolitan area. The Council helps its member communities plan in the areas of land use, housing, environmental quality, energy, transportation, and economic development.

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Executive Director

Credits

MAPC Project Manager:	Karen M. Pierson
Contributing Writer:	Betsy Lewenberg, Newton
Technical Review:	Judith Wagner Jonathan G. Truslow Donald E. Megathlin, Jr.
Graphics:	Barbara Pickles Dave Speidel
Production:	Ladis P. Bernier Michael Furnari John Trainor

Newton-Waltham Recycling Project Staff

Project Coordinators:	Betsy Lewenberg, Newton Marianne Lynnworth, Waltham

The project coordinators extend special thanks to the following individuals for their time and effort: Virginia Cole, Tina Girdwood, and Margaret Pustell of Andover; Charles Ingalls, Lawrence Slaney, and Betty Stoddard of Hanover; Charles Thomas of Newton; Ann Fisk of Rockport; and Charles Kiley of Wellesley.

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INTRODUCTION

WHY THE 80'S ARE DIFFERENT

Just as the 1970's were the decade of the environment, so the 1980's seem to be the decade of the economy. Recycling wastes--once done in the spirit of environmentalism--is becoming an economic necessity for many communities who now face waste disposal costs which have increased three to ten-fold in the past five years.

Some communities that recycle now earn a profit in their recycling programs. Others find recycling cost-effective simply because the reduction in the waste stream allows their landfill to last longer or reduces the fees that must be paid for every ton of refuse disposed of in commercial disposal facilities.

The resource-conservation arguments for recycling still hold: namely, reduced amounts of solid waste require less land for landfills, conserve natural resources (such as the metals in cans), and save energy because recycling generally uses less energy than producing new goods from virgin materials. But these environmental and energy arguments now must be expanded to include the economic benefits of recycling materials.

In the last decade, changes in economic conditions and a variety of other factors have altered the array of options for local solid-waste management. For instance, the price of solid-waste disposal is increasing because of rising transportation costs and the new costs to protect the public health and the environment adequately. As knowledge about landfill leachate, methane-gas control, and other technical problems increases, more protective measures are necessary to reduce the problems with landfills. Similar problems and the need for protection accompany other forms of disposal. These rising costs mean that recycling is an increasingly attractive economic proposition, since every ton of waste recycled is one less ton for costly disposal. At $3 a ton, marginal reductions in solid waste tonnage did not make much economic difference; at $30 a ton, recycling becomes an option to be considered seriously.

From large-scale refuse-to-energy systems (commonly called "resource recovery" systems because energy is captured when wastes are incinerated) to recent beverage container-return legislation, Massachusetts is changing the ways it disposes of its solid waste. The various methods of waste handling can be distinguished as follows:

-- Resource recovery, as mentioned above, is recapturing energy or heat from incinerated wastes. This method requires large quantities of waste and produces both ash and gases which must be disposed of and/or neutralized.

-- Recycling for reuse, entails collecting materials--such as milk bottles or soft-drink bottles for refilling and redistribution to the consumer.

-- Recycling for reconsititution, causes metals from soft-drink cans or glass from food containers to be crushed, remelted, and refabricated into new products. Many other materials including newspapers, cloth and high-quality papers (such as computer cards) can be recycled in this way.

-- Landfill "disposal" is the familiar process of dumping wastes of all sorts in a landfill site. For best results wastes should be covered daily with soil, but as has been noted, considerable problems often occur as "after-effects" of landfill methods.

All of these methods can be employed by towns in the Commonwealth, particularly in light of the possible development of two large resource-recovery systems in the metrcpolitan Boston area and the Bottle Bill passed in November of 1981 (to take effect in January 1983). It is now critical to consider how these solid-waste programs can work together to the best advantage of each town or city. There is no question that they can be compatible--and in some cases even more effective together than separately--but there must be careful planning to be sure that the programs and goals do not conflict.

The Bottle Bill and Recycling

How much will the Bottle Bill affect existing recycling programs? The US Environmental Protection Agency (EPA) estimated that beverage container legislation would reduce steel cans discarded in the waste stream by about 15 percent, glass content by about one-third, and aluminum content by one-third.* While at first glance this seems a blow to recycling centers that are already economically recovering glass and aluminum, a study by the Office of Technology Assessment for the U.S. Congress shows that revenues of recycling operations should drop very little as the result of such legislation.**

There are several reasons for this, particularly the fact that beverage containers are normally made of green and amber glass which is not as valuable in the market. When several glass colors are collected, there is an inevitable amount of mixing which reduces by half the number of purchasers willing to buy it and/or decreases the payment per ton of glass.

*Garbe and Levy. Resource Recovery Plan Implementation Guide for Municipal Officials: Markets. US EPA, 1979, p. 22.

**US Office of Technology Assessment. Materials and Energy from Municipal Waste: Resource Recovery and Recycling from Municipal Solid Waste and Beverage Container Deposit Legislation. 1979, pp 82-85.

Beverage-container legislation affects little of the clear glass which comprises the majority of waste glass (approximately 2/3 of all glass containers). Therefore, recycling centers that restrict themselves to clear glass in the future may actually receive a better price or, at least, have a wider range of purchasers to whom to sell.

Public education is important so that people are aware that a bottle bill does not substitute for or eliminate the need for recycling.

Resource Recovery and Recycling

What are the possible effects of recycling on the state's plans for large-scale, regional resource-recovery plants? Obviously recycling removes materials from the waste stream that could be burned to produce energy. Here, too, the facts still support the compatibility of the systems. The only major problem would occur if a recycling program would cause a municipality's solid waste tonnage to fall below the amount they agreed to send to the resource-recovery facility. That would subject them to a financial penalty. However, this should not be the case if communities have calculated the effects of recycling before determining the contract tonnage.

Paper comprises 30-40 percent of municipal wastes. In pure resource terms, paper is considered to have a higher value when reused for paper fiber than if it is burned as an energy source. In Europe where resource-recovery plants have operated for years, recycling centers are springing up to handle materials such as glass, cans, waste paper, and used oil. In a recent report for the EPA, investigators were told that Danish recycling centers remove no more than 10-15 percent of the potential heat value.* Recent calculations made on the basis of 30 percent participation in paper recycling found that the heating value in the waste stream would be reduced no more than 7 percent.**

The development of resource-recovery plants does not diminish the value of and need for recycling. Usually, every ton that is not put through a recovery system is money saved by a community. Revenues from the sale of the materials further enhance the value of the recyclables. Some materials, such as newsprint, are too valuable to be wasted as fuel for a recovery facility, while others are of little value to the recovery facility anyway.

What's more, recycling has been shown to reduce equipment deterioration and ash creation in recovery plants.*** The glass and aluminum recovered mechanically either before or after incineration in a resource-recovery plant is generally of lower quality than that hand-separated through recycling.****

---

*Refuse-Fired Energy Systems in Europe: An Evaluation of Design Practices, US EPA. November. p. A-12

**Schaeffer. Municipal Waste to Industrial Energy. 27 August, 1980 p. 5

***Ibid. p.7.

****Garbe and Levy. Op. Cit. pp. 23-25.

Recycling and resource recovery must be carefully planned, so that recycling--particularly the commonly recycled waste paper--will not impinge on resource-recovery revenues and vice-versa. Communities contemplating their own resource-recovery plant risk more possible conflicts; regional resource-recovery facilities are not likely to feel the effects of recycling in the overall waste stream due to the diversity of waste sources. However, communities signing a contract guaranteeing a certain tonnage must carefully coordinate recycling plans with anticipated tonnages.

Keeping all these factors in mind, it should be possible to develop a solid-waste plan for the 1980's that will be both environmentally and economically beneficial for cities and towns faced with solid-waste problems.

PART I. THE PROCESS OF RECYCLING

Before beginning a recycling program, there are several questions that need to be asked.

- What is recycling?
- What materials can and should be recycled?
- Which is the best approach to recycling in [illegible]unity -- curbside collection [illegible] depots?
- [illegible]me of materials can we expect to recycle?
- To whom should we sell our recyclables?
- How much should we expect to receive for them?

Finally, difficult questions governing the day-to-day operations of a recycling center must be asked.

- Where should recycling facilities be?
- How should they be staffed?
- How should arrangements be made with the recyclables purchaser?
- What types of collection trucks can be used?
- How many individuals are needed to operate them?

The following chapters will help you answer these questions for your community.

CHAPTER I

CALCULATING THE BENEFITS OF RECYCLING

Although recycling is not always a directly profitable enterprise, the indirect benefits usually outweigh the costs of setting up and running a recycling program. As the costs of other waste-handling methods increase, the savings produced by reducing the amount of wastes which have to be disposed of in landfills or other facilities may pay for the costs of running a recycling program. These indirect savings may even surpass the program's costs, whether or not recycling actually brings in revenue from the sale of recycled materials. These less visible benefits need to be calculated into a municipality's evaluation of whether recycling is economically feasible.

It is clear that towns in the MAPC region are already feeling the crunch of both increased costs and tightening regulations. Recent information from the Massachusetts Department of Environmental Quality Engineering (DEQE) shows that most communities in the MAPC region rely on landfills for their solid waste disposal. Twenty-three of the 45 municipal landfills violate sanitary-landfill regulations. These sites eventually will have to be upgraded or closed and an alternative site located, all very costly propositions. Twenty municipal landfills--some in violation and some not--are expected to run out of space within the next five years, requiring them to seek new, generally most costly, disposal options. Even communities using commercial disposal facilities are not free from risk, since over half of the commercial operators serving eastern Massachusetts communities have also received citations for violating regulations. Clearly the costs of waste handling will continue to increase in the region.

The calculation of the benefits and costs of recycling must be done in a context that reflects the total current (and future) solid-waste disposal costs of the community. The costs of recycling should be carefully distinguished to be those <u>additional</u> costs which can be directly attributed to establishing, staffing, equipping and managing a recycling program in your town. Be careful not to double costs which are actually part of regular waste-disposal operations. On the other hand, be careful not to undercount the costs of new equipment (including depreciation) or labor (including fringe benefits). For example, let's say your town does not have curbside service, but has a truck which handles other municipal wastes that is only in operation two days a week. It is accurate to charge for the <u>additional</u> cost of driving the truck on extra days to handle recycling, and to charge for the <u>additional</u> labor required to drive the truck. It is innaccurate to place the whole cost of the truck's service on the recycling program, even though it is the same truck.

To calculate the costs of a recycling program, the following items should be included, as shown in the sample cost sheet (Table I-1).

1. Labor

   -- Collection crews/drivers OR
   -- Monitors at drop-off depths OR
   -- Both, if you choose a composite system.

2. Administrative Costs

   -- The extra time it will take a bookkeeper to manage the accounts, payroll and financial transactions of a recycling operation.
   -- The amount of a manager/administrator's time required over and above what is now used.

3. Equipment

   -- Capital costs for purchase of new trucks, crusher, bins, bailer, or other equipment, OR
   -- That portion of the cost of equipment (being purchased or paid off) which will be related to recycling (i.e., if a truck is used 20 hours a week for recycling, half of its cost should be charged to the recycling program).

4. Operation and Maintenance

   -- Fuel.
   -- Repairs/maintenance.
   -- Rental fees.
   -- Supplies.

5. Community education

   -- Advertising.
   -- Printing.
   -- Mailing.

6. Consulting services

Some of these values cannot be determined until you know approximately how much waste you will be handling, and until you choose the type of recycling service you plan to offer. Roughly, however, the quantity of material a recycling program must be prepared to handle can be derived from a simple formula.

Table 1-1

SAMPLE COST SHEET

COST TABLE (use estimates)

Labor _____ person(s) for _____hours/week at $ _____/hour X 52 weeks = $ _____
annual cost

Administration _____ person(s) _____ hours/week at $ _____/hour X 52 weeks = _____
annual cost

Total _____

Item	Cost
Equipment _____	_____
_____	_____
_____	_____
_____	_____

Total _____

Operation & Maintenance

Gas	_____
Repairs	_____
Rental Fees	_____
Upkeep	_____
Other	_____

Total _____

Marketing

Transportation	_____

Total _____

Community Education

Total _____

Consulting Services

Total _____

FULL TOTAL _____

TOTAL ÷ Tons Recycled = cost per ton

Quantity of Recycled Material =

Total Solid Waste	x	Percent Recovered
(tons generated per person x total population)		(average percent of material recovered in recycling programs)

Current estimates assume that .47 tons of solid waste is generated per person per year. In Massachusetts, the average percent of material recovered ranges from 5% (low) to 25% (high). A medium range is 13 to 15%, according to an April, 1981 report from the Corporation for a Cleaner Commonwealth (CCC).*

Thus, Table I-2 shows the amount of recycled material that should be expected from a town with 5,000 population. This number will give you a base from which to figure the amount of equipment you would need, the number of person-hours, and other costs which would be related to handling that quantity of waste.

Once you have totaled all the costs of recycling, you can divide that figure by the tons of waste recycled (in the example, 117.5 tons) and come up with a figure of cost per ton. This figure can then be compared to the average cost of disposal by other methods.

The benefits of recycling are of three types:

- -- direct, or the actual revenues from selling recycled materials;
- -- indirect, or the amount gained by reducing the waste stream and therefore paying less for overall disposal;
- -- intangible which include the conservation of natural resources, and energy saved (on the large scale) by recycling materials instead of consuming new resources. (These figures can be calculated on regional or national levels, but the average municipality would not immediately notice any results of these effects.)

To estimate the benefits of recycling, the following items should be included:

- -- revenues from the sale of recycled materials (see below);
- -- disposal fees saved (money saved by reducing the waste stream by extracting recyclable materials) (see below); and
- -- annual potential landfill space savings due to recycling.

---

* Ng, C.K and P.G. Schindler, 1981. "Recycling: Potential Savings in Waste Disposal Costs." Corporation for a Cleaner Commonwealth Technical Report #1 (April), page 15.

Table I-2

HOW TO CALCULATE THE QUANTITY OF RECYCLABLE MATERIAL FOR YOUR COMMUNITY

You Need		Our Example:
1.	the municipality's population	(5,000 people)
2.	the average quantity of solid waste produced per person per year	(.47 tons per year)
3.	the average percentage of total solid waste that is recycled	(5% average beginning rate for recycling paper, glass, and cans)

Put them in the formula:

Recycled Material = ((Population) (.47)) X (% Recycled)

= ((5,000) (.47)) X (.05)

= 2,350 tons X .05

= 117.5 tons

Revenues from the sale of recycled materials can be estimated for planning purposes by:

-- taking the anticipated amount of material to be recycled (in our example 117.5 tons);
-- determining the expected quantities of each type of waste (such as paper, bottles, and cans) by using averages for composition of solid waste; and
-- multiplying those amounts by the average price per ton for these materials.

These estimates will be discussed in more detail in the next session.

A study done by SCS Engineers evaluated the composition of recycled and non-recycled waste in twenty households.* They found that recyclable waste was comprised of the following:

-- Glass: 24% of total recyclables
-- Bimetal Cans: 9% of total recyclables
-- Aluminum: 2% of total recyclables
-- Newspapers: 65% of total recyclables

Multiplying these figures by the total amount of waste anticipated to be recycled (in our example, 117.5 tons) will show the amount of each type of waste recycled. These quantities can then be multiplied with the respective price per ton that these materials will bring, shown in Table I-3. The calculations for our sample community are shown in Table I-4.

It should be emphasized that the percentage breakdown of recyclables shown above is an average. Your community may vary, particularly if you plan an agressive recycling campaign to include all types of papers, compost material, plastics, and so on. More accurate percentages for these categories of materials may be derived from Table I-5.

Solid-waste disposal fees saved can be estimated by multiplying the amount of material recycled (thus removed from regular disposal) by the cost per ton of disposal in your town. The average cost per ton has been calculated by the CCC to be $16 per ton for the general area covered by MAPC.** So, if 117.5 tons of material are diverted from the disposal process, the amount saved in disposal fees can be approximated as:

117.5 x $16 =$1,880.

---

* SCS Engineers, Inc., 1974. "Analysis of Source Separation Collection of Recyclable Solid Waste Collection Center Studies". US Environmental Protection Agency, Report No. EPA/530/SW-95c.2., page 9.

** Ng and Schindler. Op. Cit. Page 20.

Table I-3

AVERAGE PRICE PER TON FOR RECYCLABLES:
NEW ENGLAND AREA, APRIL 1981

Material Recycled	Range of Prices ($ per ton)*	Average ($ per ton)
Glass	25 - 39	33
Aluminum	300 - 480	425
Bimetal Cans**	30	30
Recycled Paper		
--newspaper	10 - 30	16
--corrugated cardboard	5 - 100	20
--tab cards	60 - 150	116
--computer print-out	40 - 110	79
--white ledger	40 - 60	50
--high-grade office paper	50 - 70	60

*Derived from Tables 1 - 4 in Appendix A. This price is the delivered-market price. Hauling costs approximate $10/ton, depending on the transportation method chosen. For further information, refer to Chapter IV and Appendix A.

**Price quoted is for a long ton (2,240 lbs.). The average price for a short ton is $27.

TABLE I-4

HOW TO ESTIMATE THE REVENUES FROM RECYCLED MATERIALS

You need to know:

1) Amount of estimated recycled material for your town (in our example, 117.5)

2) Quantities of each type of recycled material. (This example uses the percentages on page 11, but a more accurate breakdown for specific categories may be derived from Table I-5.)

3) Average prices for material by type. (See Table I-3 with average prices for New England markets.)

To estimate revenues:

Glass: 24% x 117.5 tons = 28.2 tons

28.2 tons x $33/ton = $930.60

Bimetal Cans: 9% x 117.5 tons = 10.575 tons

10.575 tons x$27/ton = $285.525

Aluminum: 2% x 117.5 tons = 2.35 tons

2.35 tons x $425/ton = $998.75

Newspaper: 65% x 117.5 tons = 76.375 tons

76.375 tons x $16/ton = $1222.00

Estimated Total Revenues = $3436.875

TABLE I-5

RECYCLABLE MATERIALS AS PERCENT OF TOTAL RESIDENTIAL WASTE

Material	Percentage of Total Waste
Paper	30-40
- Newsprint	(9-15)
- Magazine	(1-3)
- Corrugated	(1-2)
- Other	(19-20)
Glass, Beverage	7-16
- Clear	(4-9)
- Green	(2-4)
- Brown	(1-3)
Glass, Other	6.5-10
- Clear	(5-6)
- Green	(1-3)
- Brown	(0.5-1)
Ferrous, Beverage	0.5-2
Ferrous, Other	3-5
Aluminum, Beverage	0.1-1
Aluminum, Other	0.1-1
TOTAL RECYCLABLE REFUSE	47.2-75

Source: Source Separation Collection and Processing Equipment: A User's Guide. US Environmental Protection Agency. 1980. p.1.

A method to estimate the potential landfill space saved, which may tell you about the benefits of prolonging the life of your town landfill and postponing new and costlier disposal methods, has been devised by the CCC. They say to multiply the annual tonnage of solid waste by 2.5 cubic yards/ton and then multiply the result by (1.25) x (.00061983). (These figures are the figures assigned to the ratio of solid waste and cover material required in the landfill to total solid waste, and the ratio of acre-feet per cubic yard.)* This figure is the volume of landfill space required per year in acre-feet. This number should then be multiplied by the percentage of solid waste which can be recycled, or in our example, 5%.

A sample benefits sheet is shown as Table I-6. By adding the direct and indirect benefits of recycling (the revenues produced and the savings on disposal fees), a figure in dollars results which can be compared to the total cost figures found for running the recycling program calculated using Table I-1. If benefits approximate or are greater than costs, your program should be economically justified.

In summary, this chapter shows how to evaluate the anticipated costs of setting up a recycling program and the benefits (financial benefits and saving of landfill space) from the program. Once you have determined that there is an obvious net gain to recycling, then develop your program, as outlined in the following chapters.

*Ibid., pages 12-13.

Table I-6

SAMPLE BENEFITS SHEET

1. Add Revenues Derived from Table I-4

   Total Revenues = $3436.87

2. Add Saved Disposal Costs.

   (Total recycled material X disposal cost per ton)

   117.5 tons x $16 = $1,880

   TOTAL PECUNIARY BENEFITS $5,316.87

3. If you have a municipal landfill, you should calculate the amount of landfill space spaced.

   Divide the space saved by the amount of landfill space used annually to find the percent of space saved per year. If you save 10 percent of your space, and your landfill has an estimated life of five years, you would be able to save half a year's space in those five years, extending the time you can use your landfill by six months.

   If you saved 25 percent of your annual landfill space and you have a five year capacity left, you will extend the life of your landfill by a year and three months (15 months).

CHAPTER II: WHAT CAN BE RECYCLED?

Recycling, or source separation, is the separation of certain materials from those that would otherwise end up in the waste stream to be landfilled or incinerated. Paper is certainly the most commonly recycled material, but other items such as glass, metals, and plastics are also recycled. The percentage of recyclables in a local waste stream was shown in Table I-5 (for Marblehead and Somerville). This is fairly representative of many residential communities.

Although many communities began, and still maintain, recycling for only one item, usually newspapers, others have expanded their operations to include two or more recyclable materials. Communities in greater Boston that recycle generally recycle one or more of the following categories of materials:

-- newspapers,

-- mixed papers,

-- corrugated cardboard,

-- high-grade paper,

-- glass,

-- ferrous cans,

-- bulk metal (white goods),

-- aluminum, and

-- leaves and other organics for composting.

Marketing of Recyclables

Finding reliable, well-paying markets is the key to a successful recycling program and should determine what materials are collected. Unfortunately, the markets for materials in New England are somewhat limited. Communities further limit their options by the way they handle recyclables. Communities often take the easiest approach (which involves minimum sorting and preparation of materials), but this may also be the least profitable route. In the long run, this may make the program harder to manage successfully.

Prices received for recyclables depend upon many factors:

-- Purity of materials: Mixing several colors of glass and leaving rings and caps on bottles makes recycling easier and encourages participation, but reduces the market for these materials. The maxim holds for paper, too: mixing lowers profits.

-- Transportation costs: Transportation can be provided by the community, by a private hauler, or by the purchaser of the recyclables. The first two options are the most economical; the latter is generally more costly but has the benefit of giving the work to someone else.

-- Volumes of recyclables: Larger volumes bring in higher prices per ton. If a few communities join together to sell their materials, they may receive a higher price.

-- Marketing expertise: Shopping around for buyers can result in a better deal than just accepting the first offer you receive. Contact other communities to see to whom they sell their materials and to find out what prices they receive. Try to avoid go-betweens; deal directly with mills and factories which use recycled materials when possible. Diversify markets as much as possible to avoid getting locked into an arrangement with only one market. You will have better bargaining power and will not be ruined if one market should disappear.

-- Contracts: Contracts can assure a floor price; that is, the price per ton will not drop below a certain price regardless of market fluctuations. They also can work in reverse--to prevent prices from rising to top dollar in a strong market. Contracts limit your flexibility in "shopping around" once a commitment is made. Most communities find contracts beneficial; a few, however, prefer not to lock themselves into one market.

Appendix A lists markets and prices for paper, glass, and metal in this area. A more comprehensive list was prepared by the Corporation for a Cleaner Commonwealth; reference copies are available in the MAPC library. There are other possibilities which neither of these lists may encompass. A small broker or mill in your town or area may purchase recycled materials. You may find these or other purchasers in the yellow pages in the phone book. Obviously, mills pay more than brokers.

It is important to note that the market price for recyclables fluctuates, especially in the paper business. Sometimes prices vary seasonally; sometimes fluctuations seem random. It is important to plan your recycling program so that these price variations do not cause problems. You may want to consider price cycles when you decide what materials to include in your program.

CHAPTER III: LOCAL RECYCLING MODELS

Most communities use one of two approaches to recycling:

-- a drop-off center, also called depot recycling, or

-- a curbside-collection system.

The two approaches need not always be used separately and may be part of a two-pronged recycling program.

Depot Recycling

The majority of recycling programs in the New England area operate through a depot system, a drop-off site for recyclables, usually located at the community landfill area. Depot systems have several advantages. Depots are usually located at landfill sites where personnel are already employed to oversee trash disposal. Since there are no collection costs and minimal staffing needs, this is the cheapest of the two approaches. In addition, several materials can be recycled by the community with little or no effort beyond that expended to recycle one or two materials due to the fixed, one-time costs of establishing the depot.

Depots have disadvantages, however. First is the inconvenience with the depot system, especially in communities where trash is collected. Residents may have to make a separate trip to the depot to deposit recyclables. Second, recyclables must be separated at home and kept separate during the trip to the recycling center. This effort requires more involvement from local residents. For these reasons, less materials tend to be collected in depot systems than in curbside programs.

There are variations on the depot idea. Communities may specialize depots to accommodate different clientele, such as a commercial drop-off center for high-quality waste office paper or a depot for corrugated cardboard wastes. The location and number of depots may vary in an attempt to bring the depot closer to potential recycling participants.

Although usually situated at landfill sites, depots can be located in shopping centers or other central locations. These sites make it convenient to drop off recyclables while doing other regular errands. In addition, by being highly visible, recycling is self-publicizing. Central locations such as shopping centers may also make it possible for the depot to be available 24 hours a day.

On the other hand, centrally-located depots have their disadvantages. They are often prone to vandalism, since they are generally not fenced off. Because they are often unstaffed, materials may be placed in the wrong bins, leading purchasers to reject materials or to lower prices, Maintenance problems can result in a negative image for the program, decreasing participation.

Probably the most important decision to make once a community

chooses to set up a recycling depot is whether it will be staffed or left unattended. Staffed depots offer supervisors to ensure that materials are properly separated and foreign materials excluded, and to explain the program and distribute information to visitors. This helps to avoid many problems from the start. However, staffing can be costly. Some communities use volunteers to reduce costs, but volunteers may be hard to recruit and supervise, and may be less reliable than paid staff.

While unstaffed depots offer lower costs than staffed sites, experience has shown that participation in unstaffed drop-off centers is low. No one is present to give out information and encouragement. Quality of materials may be low since no one screens unwanted or improperly sorted materials from the recyclables. Unstaffed depots are difficult to maintain, sometimes leading to an unsightly center with a negative image in the community.

In the long run, staffed depots present the better option, although they may require a larger cash outlay in the short term. The reason is simple: properly staffed depots yield greater tonnage and revenues than unstaffed centers. Initial costs and operating costs may be repaid more rapidly, with profit more likely than with the staffed center.

Curbside-Collection Recycling and Collection Vehicles

Collecting recyclables from curbside is the easiest way to encourage recycling, since it requires the least effort from participants. To date, few communities in the greater Boston area collect recyclables from the curb (Table III-1). The lower frequency of this approach is due not only to its higher costs, but also because relatively few communities in the region collect trash or garbage from curbside. Most communities maintain local landfills or transfer stations to which citizens transport their own trash.

As more communities close their landfills, curbside trash collection may increase. Depending on who collects the trash (municipal trucks, private haulers, or a disposal firm), a curbside-recycling program may be a logical component of the curbside service, particularly since every ton recycled is one less ton to pay for at the disposal destination.

Curbside programs require greater planning than depot systems. Decisions to be made before the program begins include:

-- the frequency of collection;

-- the materials to be collected; and

-- the mode of collection (whether the municipality, a private hauler, or a non-profit recycling group will provide collection services).

If community collection is decided upon, the following must be arranged:

-- the collection vehicles;

-- the collection route; and,

TABLE III - 1

CURBSIDE COLLECTION RECYCLING PROGRAMS IN EASTERN MASSACHUSETTS

COMMUNITY (POPULATION)	RECYCLABLE(S) COLLECTED FROM CURBSIDE	COLLECTION FREQUENCY	VEHICLE(S) USED	MUNICIPAL OR CONTRACTED COLLECTION
Andover (26,000)	paper corrugated cardboard glass (color-sorted)	every other week every other week every other week	separate truck with compartmentalized trailer	contracted
Arlington (50,000)	newspapers	once per month	separate truck	municipal
Bedford (12,500)	mixed papers glass (color-sorted)	weekly weekly	separate truck which keeps materials separated	private
Chelmsford (32,000)	newspapers	monthly	2 separate trucks	municipal
Lynnfield (12,000)	mixed papers	monthly	private cars	Boy Scouts
Marblehead (22,000)	mixed papers glass (color-sorted into clear and green-brown mixed) cans	weekly weekly weekly weekly	2 compartmentalized trucks	municipal
Newton (88,000)	newspapers glass (color-sorted into clear and green-brown mixed) cans	weekly once per month (for each of clear and green-brown mixed) twice per month (collected with glass)	3 separate trucks (2 for paper 1 for glass/cans	municipal
Waltham (57,000)	newspaper corrugated cardboard (from commercial areas only)	weekly 1-2 times per week	2 trucks	municipal
Weymouth (56,000)	mixed papers	monthly	6 separate trucks (used only on 2 days per month)	municipal

-- the depot for the collected materials (bins or containers that the collection vehicles can easily unload into).

Frequency of Collection

The optimal frequency for curbside pickup is hard to generalize. Marblehead, for example, collects glass, cans and papers weekly and earns a profit. Newton collects glass and cans twice a month and loses money. Weymouth operates a profitable monthly collection program for newspapers. The bottom line depends on participation and efficiency of collection. Participation is generally the greatest when collection is more frequent. Yet some programs collect materials only once or twice per month and have excellent participation. Good public information, promotion of the program, and reliable collections may be as important as frequency in determining participation rates.

To determine how frequently to collect recyclables in your community, speak to other communities that collect the materials you wish to recycle, such as those listed in Table III-1. Compare the experiences of these communities to what you might expect in your city or town. Among the criteria you should consider in determining the frequency of collection are population density, available workers and vehicles, estimated tonnage and revenues, and collection costs.

You may find that the frequency of collection is determined by the availability of a truck and crew. For example, some communities have "slow days" when one or more trucks and crews are not collecting refuse. This often becomes the recycling day. Other communities find a truck and crew available for collection by rerouting and/or expanding trash pickup.

Responsibility for Collection

Most communities collect their own recyclables. Some, however, contract collection to private haulers and, in a few situations, to private organizations (such as Boy Scouts). Municipally-run programs have more earning potential than contracted collections. There are, however, higher costs that must be defrayed by the revenues combined with the savings of avoided tipping fees. Some public works departments are not anxious to take on the additional work necessary to operate a successful program.

Private haulers often operate on a flat fee basis. Sometimes the hauler may opt for a predetermined percentage of recycling revenues. The community and the hauler must negotiate a system that accommodates both of their needs.

When private groups operate curbside recycling, the municipality bears no direct costs yet realizes the savings in avoided disposal or landfill costs. However, some communities want direct revenues that this model does not offer (unless the nonprofit group is actually an adjunct of the community), and dislike the risk that the recycling organization will prove unreliable.

Collection Vehicles

There are four methods for collecting recyclables. The most obvious uses a separate truck, such as a compartmentalized truck designed to collect a variety of materials at the same time. Such trucks are used in Marblehead, and Newton, Massachusetts.
The second approach is the "adapt-a-truck" strategy, generally dependent on whether there is excess equipment available at the local public works department. This could be a compactor truck, a pickup, or a dump truck. The other two techniques collect recyclables along with other refuse: one by attaching a trailer behind the trash truck, and the other by mounting a rack onto the standard refuse collection vehicle to collect newspaper or other recyclables.

According to EPA, separate trucks are used most frequently, primarily because of the availability and low cost. However, the higher labor costs of this approach necessitate at least a 19% rate of participation to make separate trucks feasible.* Consequently, many communities have turned to the use of racks.

The type of vehicle a community chooses depends upon what is being collected as well as the availability and cost of vehicles. Almost any vehicle can be adapted for recycling. If more than one material is being collected, the truck might lend itself to partitioning to accomodate all the recyclables. The advantages and disadvantages of the four collection approaches are summarized in Table III-2.

For further information on collection vehicles, refer to the US Environmental Protection Agency (EPA) publications, A National Survey of Separate Collection Programs (pp 52-63) and Source Separation Collection and Processing Equipment: A User's Guide (pp 17-27).

Mandatory vs. Voluntary Programs

An increasing number of recycling communities are finding that voluntary programs do not generate enough tonnage of materials to offset the high collection costs. Mandatory programs have generally enjoyed double the rate of participation of voluntary ones. There has therefore, been a trend towards mandatory programs. While often not enforced, mandatory programs present a psychological/legal impetus to recycle.

Marblehead has the right to impose a $50 fine on persons violating the "Refuse By-Law of the Town of Marblehead" that includes a requirement to separate cardboard, newspapers and magazines, bottles and other glass containers made of clear or green glass, and aluminum, steel, and tin cans for recycling. Chelmsford's town meeting voted for mandatory recycling on glass, cans and paper; the town will refuse to pick up unseparated trash. Newton prohibits the inclusion of newspapers in general refuse.

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* Cohen. A National Survey of Separate Collection Programs. p.63.

TABLE III - 2 ADVANTAGES/DISADVANTAGES OF VARIOUS COLLECTION OPTIONS

Collection vehicle	advantages	disadvantages
separate truck	-- can utilize surplus equipment with little start-up cost	-- trucks can usually collect only one recyclable
	-- large storage capacity	-- labor costs for separate crews make high operating costs
		-- to have a truck available for recycling pickup may involve collection of recyclables on different day from other refuse, which may decrease participation
rack or "piggyback"	-- minimal operating costs	-- small capacity, resulting in extra time spent loading and unloading
	-- low start up costs - racks can be inexpensively fabricated	-- not all trucks can be adapted for rack installations
		-- can only collect one recyclable on rack because of small storage capacity
trailer	-- low operating costs	-- poor maneuverability, especially in narrow streets and alleys
	-- better storage capacity than racks	-- illegal in some states
	-- many are mechanically unloading, making this task easy	-- more costly than racks - from $3,000 on up (1979 figures)
	-- can be easily modified to accept two or more materials	
compartmentalized vehicle	-- can collect several materials, increasing revenues and decreasing cost per ton	-- high capital costs
	-- simultaneous collection of all recyclables makes weekly pickup possible, creating an easy to remember system that should increase participation	
	-- can be created by converting extra trucks to compartments	

Anti-scavenging Bylaws

Curbside-collection programs inevitably face problems with unauthorized people picking up recyclables, primarily paper to sell for their own benefit. The scavengers, while removing material which would otherwise have to be disposed of, are reducing the revenues that are necessary to defray recycling costs. To minimize this problem, anti-scavinging bylaws have been instituted with fines ranging from $25 to $250 to reduce the occurrence of this problem.

Chelmsford adds the following to its mandatory recycling bylaw: "$100 fine for anyone removing designated recyclables from curb on pick-up days."

CHAPTER IV: HANDLING AND TRANSPORTING RECYCLED MATERIALS

Regardless of whether a recycling program involves curbside collection or a drop-off depot, communities must acquire containers for the materials. A method must be arranged to transport materials to their market. Containers may be purchased or leased. Materials may be transported to market by municipal or private hauling, or the purchaser of the recyclables can be responsible for providing containers and hauling materials away. The system chosen depends upon the types and volumes of materials to be recycled, as well as the level of involvement the community is willing to invest in order to maximize profits.

Several types of containers exist for the recycled materials. Factors to consider in choosing containers include the anticipated volume of recyclables, method of transporting them to market, the types of traffic at the recycling area (e.g., private cars vs. packer trucks or dump trucks), and the anticipated traffic level. Table IV-1 outlines the advantages, disadvantages, and typical costs of each option.

As a rule, smaller communities or new programs in our region often use steel or fibre barrels. As tonnages improve, dumpsters and/or roll-off containers are purchased. Gaylords are used less frequently. Many variations of on-ground partitions can be found locally.

Outright purchase of containers is generally the most economical alternative in the long run; however, leasing does not involve as large an initial capital outlay. To evaluate the relative advantages of each option, considerations must be analyzed, such as tonnage recycled, leasing and interest rates, number and cost of containers needed, and what the recycling purchaser will pay the community for their recyclables under the various options being considered.

There are several options available for transporting recycled items. Municipal employees and vehicles may be used, as can a private hauler (paid out of the municipal budget). The recyclables purchaser can also provide transportation, although the cost will be reflected in a lower price per ton. Although the first option is generally the most economic one (provided that existing equipment can be used and no large capital outlay is necessary), union and/or insurance regulations may preclude this option in some communities. While purchaser transportation generally is the most costly, it is often chosen because of the simplicity of the arrangement. For additional information on handling and transporting equipment, the reader should refer to pages 27-47 of the EPA's Source Separation Collection and Processing Equipment: A User's Guide.

TABLE IV - 1

ASSESSMENT OF CONTAINERS AVAILABLE TO HANDLE RECYCLABLES

Description of Container	Advantages	Disadvantages	Approximate Cost*
on-ground partitions (created with steel drums, plywood, etc.)	low cost; easy to set up	additional handling is necessary to transport to market	minimal
steel or fibre barrels (20-55 gallon sizes)	low cost; easy to set up	a fork lift is necessary to move and load for transport	minimal - secondhand ones can be bought from $1-3 each or obtained as donations from local companies
gaylords (large, corrugated containers)	low cost	only good for light-weight materials; must be kept indoors; short life span	free or low cost ($6 each)
dumpsters	good capacity; durable	may require specialized equipment for unloading	$250-$1200 each, depending on size
roll-off containers	large capacity; difficult to vandalize; can be partioned to handle several materials	Costly; requires special truck to transport to market	$3000 for 30 yard open top container; may also be leased for approximately $1300/year paid off in 3 years (rates subject to change as interest rates change, Aug. 81 quote);** containers also can be provided by recycling company

*Note that prices shown are from 1981.

**In August 1981, a $3000 30 yard, open top, roll-off container could be leased for $101.65 per month, with a prepayment of $359.40, for a total of $4,200. This price fluctuates with interest rate changes. Leasing companies in the Boston area include: Leasing Corporation of America (1390 Main Street, Weymouth, 331-3800); Colonial Engineering Company (100 Smith Street, Cambridge, 864-8600); Burtman Iron Works (59 Sprague Street, Boston, 02137, 364-1200).

Should a community want to operate a more sophisticated recycling program, additional equipment is available to maximize profits. Appendix B contains many of the equipment types, their purposes, and approximate costs.

PART II: HOW TO START A COMMUNITY PROGRAM

Without the backing of community officials, particularly those directly involved in starting and maintaining successful recycling centers, and the support and understanding of town residents, a recycling program of any type is impossible.

The local government structure in New England makes it all the more necessary to enlist a broad base of community support for a successful recycling program. This part of the handbook outlines ways to build a local consensus for municipal action, and, once implemented, to keep the recycling program a permanent and successful part of your town's management of solid waste.

CHAPTER V: STARTING A LOCAL PROGRAM

As the preceeding chapters have shown, the most important step in the process of establishing a successful recycling program is collecting all the information necessary to inform and convince people in your town that recycling is a workable idea. You will need to assess not only the technical and organizational aspects of a program, but also the political and social factors which will affect the outcome of efforts to begin recycling.

The following factors must be thoroughly researched:

1. How much solid waste is your town now handling?
2. Of that, how much could be diverted into a recycling program?
3. What would be the costs of starting and maintaining a recycling program in your town?
4. What would be the benefits of recycling?
5. Which method--drop-off depot or curbside collection--would best suit your municipality?
6. What equipment would be best for your situation?
7. What is the best market for your recycled materials?

The more social and political factors which you must also assess include:

1. Is solid waste an important issue in your town now?
2. How much do people in your area know about recycling?
3. Which town boards, agencies and citizen groups need to be consulted and involved in the recycling program?
4. What is the current commitment, if any, to a particular solid waste management approach?

In order to determine how much solid waste is being produced in your town and to estimate how much of that could be recycled, refer to Table I-1 (page 8). Table I-2 will help you estimate the costs of setting up and maintaining a program. Table I-3 to Table I-6 will help with estimates of benefits from a recycling operation. Table III-2 and IV-1 will provide some help in technical questions about equipment and methods for the recycling program.

As you determine how recycling could fit into your community's overall solid-waste plan, it is essential to determine the roles and interests of various groups, boards, agencies or town departments dealing with solid waste. It is important to meet with these individuals and groups to enlist support and to learn their concerns first hand. The proposed program should help solve their problems--not create new ones.

These groups will vary from town to town. In some communities, the boards of health are responsible for solid waste, while in others it may be the board of selectmen, the department of public works, or a combination of agencies. These groups should be very helpful in collecting the basic information you need on the quantities of solid waste to be handled, the existing equipment used by the town for solid waste management, the current costs of handling solid waste, staff schedules (determining the flexibility in staff assignments), and the projected need for changes in solid-waste management (the longevity of the town landfill, hauling contract, or possible involvement in regional resource-recovery facility).

If you work with these officials throughout the planning stage of the project, it will be easier to prepare a proposal for the appropriate decision-making body (board of selectmen, mayor, or other officials). Usually the first step is to request a feasibility study for such a program; then a report must be carried out, the conclusions made to the decision-making body, and a decision made (sometimes after public hearings). Though this may seem to be a long process, remember that a program hastily approved, or accepted with many reservations, could be handicapped and may not work well. The only way to develop broad and secure support is to research thoroughly what will work best in your community and to educate as many citizens and officials as possible by involving them in the process.

Comparing your community to similar communities elsewhere can make your job easier by providing working models to which people can relate. Appendix C lists some of these working programs. Their experiences can help you determine the approach most likely to work in your own community. It might even be possible to team up with a nearby community to combine aspects of recycling programs such as marketing.

The proposal which you prepare to convince town officials and citizens of the merits of a recycling program must present information clearly and answer all the questions which you anticipate will arise during discussion. The proposal should present the information you have systematically, using realistic assumptions and providing an explanation of alternative approaches followed by the specific choice you recommend. It is wise to present the program as a community and environmental service which, hopefully, can also yield direct revenues to the town. Be sure to clearly explain the concept of direct and indirect benefits, since the indirect benefits may actually have more of an effect on the town's finances. Be prepared to answer many difficult questions, and don't preclude the possibility of revising the proposal or feasibility study several times in order to satisfy all concerns. If you can keep building good working relationships with related town officials and develop good ties with community groups such as the League of Women Voters, Lions, Scouts, Rotary, and church groups, the implementation state will be that much easier to carry out when the time comes.

CHAPTER VI: COMMUNITY EDUCATION

No recycling program, regardless of how well conceived and executed, can succeed without an effective community education effort. Community education should include a variety of activities, ranging from written flyers, brochures and press releases to visual displays, such as posters and slide show presentations. Speaking engagements to community groups and schools also publicize a program.

Prior to initiating a recycling program, intensive public education should be undertaken. An intensive media blitz, including press releases and staged "newsworthy" media events should also be planned. Flyers or brochures describing the program should be delivered to each household. A letter of support from the mayor, selectmen or other local officials is very effective as part of the brochure. The brochure should explain what the recycling program is, how it operates, how to prepare materials for recycling, and why residents should recycle. Much of this information can be incorporated into the municipal official's letter. Samples of community brochures and a press release are included in Appendix D.

People are also motivated by personal appeals. Organizing a speakers bureau to make presentations to community groups helps to win converts (and recruits for the recycling committee). In Newton, the speaking engagement includes a "trash bag show" which demonstrates what is thrown away and what can be recycled, a recycling slide show which shows how to recycle and what happens to the materials recycled, and even a folk singing performance by the Earth Tunes, a local singing group performing songs with recycling and other environmental themes. These presentations can be planned for school children as well, and modified for each grade level.

The recycling committee in Montclair, New Jersey achieved a very effective method of public education. They organized a group called Montclair Organizations for Conservation (MOC). This umbrella group includes many civic groups, such as the League of Women Voters, Garden Club, Chamber of Commerce, Board of Realtors, High School and church groups. Each civic organization helps at the recycling center on Saturdays, while MOC assumes responsibility for coordination, lobbying and public education. This technique involves a large segment of the community which then feels committed to help make the recycling program successful.

Many communities schedule poster contests. This involves many segments of the community -- school children, business donors, judges and organizers -- and also provides ready-made publicity when all the entered posters are displayed around town.

EPA rated publicity methods, based on survey results, by assigning each of 13 publicity methods an effectiveness category. The categories ranged from one to six, with six being the most effective in motivating participation. The following point values were determined.*

Effectiveness Categories (point values)	Publicity Methods
6	letter from local government
5	circulars, calendars, notices in utility billings
4	newspaper articles or advertisements
3	contests, speeches, announcements to/from civic groups, school programs
2	radio/television spots
1	posters, buttons

According to the EPA study, the most effective publicity combines publicity methods from categories 4, 5, and 6.**

It is important to continue publicity efforts even after recycling is initiated. The first blitz is not enough. Participation will drop if recycling is not periodically brought to the community's attention by using several of the techniques listed above.

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* Cohen. A National Survey of Separate Collection Programs. p. 84.
** Ibid., p. 86.

CHAPTER VII: MAINTAINING YOUR PROGRAM

A successful recycling program requires more than careful planning and implementation of the program. Proper maintenance includes continual publicity, and periodic reassessments of the program. As conditions change, program changes may be necessary. There are two main goals for maintenance: maintaining the impetus and avoiding the ax.

Maintaining the Impetus

Ongoing community education should include annual distribution of a recycling flyer, periodic newspaper articles (at least every month), and programs for the schools. An annual poster contest, clean-up drive, auction or other contest or fundraising activity further publicizes the program.

Periodic reassessment of recycling is critical. Market conditions change frequently and may necessitate program changes. Keep in mind, however, that fluctuations go both up and down; therefore, do not act rashly.

Of equal importance is the level of participation. If you operate a collection program and feel your tonnage of recyclables is poor, changes may be in order, such as different publicity techniques. If changes fail to make improvements, cutbacks may be instituted; they are preferable to eliminating the program altogether. However, don't cut back so far that you will ultimately cripple the recycling program and inadvertently cause its demise.

Participation in a depot recycling program may be improved by stepping up media efforts. Perhaps your site could be better situated, better organized and laid out, or more attractively maintained. Nothing will turn off people more than a dirty, sloppy recycling area, especially one with broken glass making access treacherous. Mixed recyclables (glass, cans and/or paper thrown into the wrong bins) will not only confuse people, but make them question whether they should make the effort to participate.

Maintain an ongoing recycling committee. Try to keep adding new members to replace those who leave. "New blood" is critical to a successful recycling committee. The committee should be responsible for all the aspects of maintenance and community education. Members of the committee should try to attend conferences and keep in touch with other communities to see what is going on elsewhere. You can always benefit from the experience of others. In addition, meetings of this nature help to remotivate and reinvigorate the people who participate.

Avoiding the Ax

With cut-backs and financial woes threatening many towns and cities, no program -- especially a new and different program -- will be safe unless it can be fully justified. It is essential to keep accurate records, so that you can explain the program at any time. These records can provide more than justification, however; they may indicate when new markets should be sought, when things aren't working well, and when changes need to be made.

Make sure you keep accurate statistics. Be sure to include tonnages recycled, financial figures (costs, revenues and savings), and recovery and participation rates (if possible). Monitor tonnage fluctuations, especially over the long term. Recycling generally picks up in the spring months, so be sure to compare months by season of the year.

To maintain your program successfully, you should meet regularly with the officials in charge of operating the program. Not only will this help assess program strengths and weaknesses, but it will establish a rapport with the local department of public works. They will pay more attention to recycling if they know someone else cares (and is watching). They should be able to supply the data necessary to keep accurate records. However, do not blindly accept these figures. Try to confirm their accuracy, since weighing procedures are sometimes lax or irregular, as can be bookkeeping.

Summary

Recycling succeeds where the following conditions are present:

-- municipal commitment to the recycling program;

-- relative ease of recycling (i.e., a well-designed system);

-- consistency and reliability in the recycling operation;

-- a steady and reliable market; and

-- effective public education.

The program will only succeed if all the conditions are included. If some are left out, it will suffer.

SUMMARY AND CONCLUSION

In the past few years the conditions for recycling have changed rather dramatically. On the one hand, the Bottle Bill was passed in 1981 after ten years of effort , creating a financial incentive (through deposit charges) for recycling to be done at the household unit level and potentially reducing the amount of materials readily available for municipal recycling programs. On the other hand, economic conditions have worsened, making municipal waste disposal costs increasingly higher and the savings from even limited recycling programs more attractive. The combination of these conditions could mean that a greater percentage of wastes will be economically recycled both privately and through municipal programs.

Besides the immediate potential savings to towns in the cost of waste disposal, and in some cases even a profit from sale of recovered materials, there are a number of long-term benefits which should begin to accrue, particularly if more forms of recycling are implemented. In the long run, we will all feel the benefits of energy savings from reduced processing of raw materials, cost savings in industry which can reduce its use of raw materials, and lower costs for such vital resources as the water saved through conservation.

In addition to these economic benefits, both direct and indirect, there are multiple environmental benefits of saving raw materials, reducing potential sources of pollution by reducing the waste stream, and handling wastes in such a way that they become a useful resource. Particularly as recycling becomes more comprehensive, the benefits to towns can be significant.

Clearly, recycling is not a simple and complete answer to solid-waste problems that plague towns and regions. Successful recycling requires conditions which are not always predictable or easy to control such as: commitment from the municipality to the recycling program; a well-designed system which makes recycling relatively easy for the user; adequate staff and resources to provide a consistent and reliable program; a steady, reliable market for the recycled materials; and effective community education which keeps the program growing and well-supported by users. A town or group which wants to implement a recycling program should have assurances that these conditions can be met, or, at the minimum, a clear, definite plan to insure that these conditions will be created. A town which fears that it cannot meet certain conditions (such as a steady market) may find that combining operations with other nearby towns will provide the quantities of recycled materials that will make it easier to market to buyers of recyclables. Such combined efforts can help more than one town succeed with recycling where no one town alone could have developed a successful program.

The prospects for recycling go far beyond the bottles, cans, and paper items which most municipal recycling programs handle. There is now proven and economical technology for recycling wastes such as vegetable wastes (which cause problems in incinerators or garbage-grinder systems because of their wetness and high nitrogen content) using low-energy composting. The end product is safe. It can be used for municipal landscaping, or sold or given away for residential or commercial use in gardens, yards and parks.

In addition, many municipalities are recycling leaves and brush through composting. In fact, this material can be used as a component in systems to recycle sludges or other wet organics, providing a full recycling program for all these materials.

Sewage and septage can also be recycled using the composting method which heats wastes thoroughly enough to completely kill pathogens and neutralize acidic or basic properties. The only such wastes which cannot be successfully transformed are toxic materials, such as heavy metals, which are not neutralized by the heating process.

New systems are increasingly being used to recycle "grey" water (water which has been used for laundry, baths and showers and kitchen use). Such water can be filtered and reused for other domestic purposes such as watering lawns and gardens or flushing toilets. Similar systems can be used in commercial and industrial situations as well. Tremendous savings in water use and wastewater treatment can result.

Industrial recycling, which is still relatively insignificant, is on the increase and can include everything from in-house systems for recycling paper or other materials to sophisticated equipment for recapturing basic chemicals or other raw materials. These can then be reused in the industrial process or, in cases, reclaimed and sold for other purposes.

* * *

These changing economic conditions, new technologies, and expanded recycling experiences within the region and the nation, emphasize the cost-effectiveness of self-help solutions to municipal problems such as solid waste and wastewater management. The 1980's may be the time that many municipalities will want to reconsider recycling as one part of a total waste-management system. After careful assessment of each situation, towns may discover that recycling makes not only ecological but economic sense for both the present and the future.

APPENDICES

APPENDIX A

TABLE 1 - MARKETS FOR GLASS (APRIL 1981)

Market	Material(s) Accepted	Preparation Necessary	Price/Ton Delivered to Company	Additional Options/Comments
Foster-Forbes National Street Milford, MA 01757 478-2500	Clear glass	None	$35/T deliveries accepted only on W 2-4:30 Sat 8:30-11:30	None
Glass Container Corp. Route 101 Dayville, Conn. 203-774-9636	Clear glass Green glass Brown glass	Color sorted Metal caps and rings removed	$39/T	None
Owens-Illinois 241 Francis Ave. Mansfield, MA 02048 339-3745	Clear glass Green glass Brown glass	Color sorted metal caps and rings removed	$30/T deliveries accepted only on Thurs. 8 A.M. - 4 P.M.	None
Recycling Enterprises Old Webster Road No. Oxford, MA 01540 987-2700	Clear glass Green glass Brown glass	Color sorted	$25/T	Containers available for $3/day. Hauling available for $150-$200 per load, depending on distance or for $10/T per glass load pickup.
Suffolk Services 98 Taylor Street Boston, MA 02122 825-9043	Clear glass Green glass (no brown glass at present time-this is subject to change however)	Color sorted metal caps and rings removed	-	30 yd. open top containers are provided. They hold 30,000 lbs. and must be full approximately every 3 weeks will be picked up for $8-$10 $10/T (price includes cost of hauling and container)
Tiverton Recycling Fish Road Tiverton, RI 02878 401-624-4454	Clear glass Green glass Brown glass	Color sorted see price/ton	$36/T with caps and rings removed $26/T with caps and rings on	20 tons or more needed for pickup - has hauling arrangement with Cal's Enterprises (823-5133). Hauling costs approximately $5/T
David White 1 Talbot Road Andover, MA 475-4110	Clear glass Green glass Brown glass	Color sorted	-	price includes containers and hauling $15-$16/T with caps and rings removed $2/T with caps and rings on

TABLE 2 - MARKETS FOR ALUMINUM (APRIL 1981)

Market	Material(s) Accepted	Preparation Necessary	Price/Ton Delivered to Company	Additional Options/Comments
Container Recovery Corp. P.O. Box 3406 12 Celina Avenue Nashua, NH 03061 1-800-258-1080	All aluminum cans	None	$.24/lb. brought to site $.23/lb. at trailers in Greater Boston neighborhoods	Container Recovery Corp. is affiliated with Anheiser-Busch and has just begun aluminum recycling programs. Additional aluminum recycling sites are expected to be set up in the near future.
Recycling Enterprises, Inc. Old Webster Road No. Oxford, MA 01540 987-2700	Aluminum cans	None	$.15/lb.	-
Reynolds Aluminum Recycling Co. 4 Tripp Street Framingham, MA 01701 620-1445 Boston #482-6231	All aluminum products, cans, foil, trays, siding, lawn furniture, tubing, storm window parts, pots and pans, etc.	All foreign materials (screws, plastic, etc.) must be removed. Large items must be cut into 3 foot sections.	$.23/lb. With large volumes, price can be higher	Pickup service can be provided if 2500 lbs. or more are to be picked up. Regional pickup centers are set up from time to time.
M. Sugarman 299 Center Street Quincy, MA 02169 479-1637	Aluminum cans	Should be crushed	Low-mid $20's/ton	Containers can be provided and picked up
Tewksbury Auto Parts P.O. Box 157 860 East Street Tewksbury, MA 01876 851-5946	All aluminum cans	None	-	Will pay $.23/lb. - price includes containers and hauling

Price is subject to market fluctuations

TABLE 3 - MARKETS FOR BIMETAL (STEEL) CANS (APRIL 1981)

Market*	Material(s) Accepted	Preparation Necessary	Price/Ton Delivered to Market**	Additional Options/Comments
Container Recovery Corp. 12 Celina Avenue P.O. Box 3406 Nashua, NH 03061 1-800-258-1080	Bimetal cans	None	No payment - will accept cans but will not pay	-
Recycling Enterprises, Inc. Old Webster Road No. Oxford, MA 01540 987-2700	Bimetal cans	Flattened	Will accept in conjunction with glass - see markets for glass for price/ton	-
Tewksbury Auto Parts P.O. Box 157 860 East Street Tewksbury, MA 851-5946	Steel and bimetal	Must be cleaned of garbage No closed containers No flammable containers No hazardous, spray containers	$30 gross (long) ton (2240 lbs.) Open 8-4:30 Mon-Fri. 8-12 Saturday	Will only take bimetal and steel if aluminum is sold to him as well
David White 1 Talbot Road Andover, MA 475-4110	Bimetal cans	None	-	Will pick up bimetal cans from communities but will not pay for them

*Additional markets can often be found by making arrangements with a local scrap metal dealer.
**Price is subject to market fluctuations.

TABLE 4 - MARKETS FOR RECYCLED PAPER (APRIL 1981)

Market	Material(s) Accepted	Preparation Necessary	Price/Ton Delivered to Market[A]	Additional Options/Comments
Consolidated Fibres, Inc. 190 Mulberry St. Brockton, MA 02402 580-1500	Newspaper Corrugated Cardboard White Tab Cards Colored Tab Cards White Ledger Computer Print Out	None None None None None None	$10/T $15/T 150 60 60 80	- -
Essex Waste Paper Co. 207 Marston St. Lawrence, MA 01841 682-5226	Newspapers & Magazines Corrugated Cardboard Tab Cards Computer Print-out	Bundled, tied & boxed In original boxes Free of carbon, paper clips, etc.	$15 (premium paid if pure paper) $5 $.05 - .06/lb. $.03 - .04/lb.	Will place containers in communities in the vicinity if volume merits and will haul paper away - will pay $8-10/ton in this system. High grades of paper (tab cards, computer print-out) can be placed separate in a section of trailer, if used and transported with other paper to Essex Waste. Delivery price would be paid for these high grades.
Great Eastern Paper Co. 133 Halleck St. Boston, MA 02120 427-5720	Newspaper Corrugated Cardboard Tab cards Computer print out	None	$15 $5-10 $150 $70-80	Could provide gaylords (corrugated container) or post office-type hampers for a fee (reflected in a lower price/ton).
Hoague-Sprague Corp. 520 Boylston St. Boston, MA 02116 262-4100	Newspapers Corrugated Cardboard	Baled Baled	- 	Picked for $20/T Picked for $25-30/T
North Shore Recycled Fibers 53 Jefferson Ave. Salem, MA 01970 289-9400	Newspaper		$15/T	Will provide containers free of charge
Roiter-Barry 360 Pleasant St. Watertown, MA 02172 923-1440	Newspaper	None	$20	With container and hauling provided price per ton would be $10

TABLE 4 (con't)

Market	Material(s) Accepted	Preparation Necessary	Price/Ton Delivered To Market	Additional Options/Comments
Roiter-Barry (con't) 360 Pleasant St. Watertown, MA 02172 923-1440	Corrugated Cardboard			Picked for $.01/lb
	White Tab Cards		$.05/lb	
	Colored Tab Cards		.04/lb	
	Computer Print Out		.04/lb	
	High Grade Office Paper		.02/lb	
	White Ledger		.03/lb	
	Colored Ledger		.02/lb	
Suffolk Service (Shaffer Paper Fibers) 98 Taylor Street Boston, MA 02122 825-9043	Newspaper	loose	$10	With container and hauling provided $7-$8/Ton
		baled	$30	
	Corrugated Cardboard	loose	$10	With hauling provided $25/Ton. Baled, corrugated, and high-grade papers can be picked up for $5 per ton off delivered to market price.
		baled	$20	
	Tab Cards		140-150	
	Computer Printout	loose	90	
		baled	100-110	
	High Grade Office Paper	loose	50	
		baled	60-70	
M. Sugarman & Co., Inc. 299 Center Street Quincy, MA 02169 479-1637	Newspaper	None	$15	
	Corrugated Cardboard	None	$6-10	
	High-Grade Office Paper		Price varies according to volume and how packed.	With hauling provided--approximately $5 per ton less than delivered to market price.

APPENDIX B

EQUIPMENT TO SUPPLEMENT BASIC RECYCLING NEEDS

Balers- Baled paper and other materials usually bring in a substantially higher price per ton, while reducing the bulk of the material to be recycled. Purchase cost is anywhere from several thousand dollars on up, depending on the age, size and type of baler. One man is necessary to operate a baler, so the labor costs would approximate $15 per ton baled. (1981 rates)

Crushers- Glass and cans can be crushed by special crushing machines or can be flattened and crushed by a steam roller. These cost $1200 and up in 1981.

Magnetic separators - These separate metal from glass and/or steel from aluminum. Separators eliminate the need for metal separation at the household level. They cost $3000 and up (1981 prices).

Fork-lift trucks are necessary if steel drums, hoppers or other containers need to be moved for loading or unloading. Costs vary according to size and options. In 1980 they cost up to $15,000 each.

Front-end loaders are used to scoop up and move materials. They are better suited for moving loose materials than forklifts. In 1980, they ranged in price from $15,000-$25,000.

Pallet trucks, which in 1980 sold for $425-750 each, are used in some areas to move recyclables. They are useful only if the materials are on pallets or in bins with lift pockets. Although substantially cheaper than forklifts, more maneuverable, and easy to operate, they require smooth flooring and cannot lift bins to dumping heights.

Conveyors help move materials and can be used in conjunction with magnetic separators. Used ones can be purchased for $100 and up (1980 prices) from trucking firms and other warehouse operations.

Hand-held trucks and dollies are used to move barrels, bales, etc. They cost $50-150 in 1979.

Paper shredders process high grade papers from offices that deal in confidential information. Prices vary.

Paper cutters remove book bindings and glues, enabling the recycling of books and bound materials which have glues and staples. Paper cutters cost approximately $1000 in 1979.

Strapping machines bundle materials for handling ease. They cost $150 or more (1981 prices).

Can flatteners reduce can volume and transportation costs by increasing the number of cans that fit into the containers. They cost $4000 or more (1981 prices).

APPENDIX C

RECYCLING IN GREATER BOSTON (APRIL 1981)

Community (population)	Contact person	Materials Recycled*	Recycling Depot or Curbside Collection
Acton (21,000)	William McClure 45 Spencer Road 01720 263-1429	mp, glass	depot
Andover (26,000)	Virginia Cole 268 Highland Rd. 01810 475-5922	mp, cc, hg, glass, al, leaf (disc-cans, bulk)	curbside
Arlington (50,000)	Richard Bowler Dept. of Public Works 643-6700 ext.239	np, bulk, leaf (disc-glass, cans)	curbside for np, bulk (glass, cans were depot)
Ashland (9,000)	Marie Heaton Board of Health Main Street 01721	(disc-np,al)	-----
Bedford (12,500)	Kenneth Pedersen 314 Great Road 01730	mp, glass	curbside
Bellingham (14,500)	-----	none	-----
Belmont (28,000)	James Castanino Town Hall 02178	mp, glass, cans, al, leaf	depot
Beverly (38,000)	Alan Taubert Dept. of Public Works Town Hall	bulk	curbside
Bolton (12,700)	Chairman Board of Health P.O.Box E 01740	mp, cc, hg, cans, bulk (disc-glass)	depot
Boston (638,000)	-----	none	-----
Boxborough (3,185)	Charles G. Radlo School No.1 Hill Rd. 01719	mp, glass	-----
Braintree (33,000)	Rachel White 54 Cochato Rd. 02184 843-0042	mp, cc, hg, glass, cans, al, leaf	depot (was curbside until 7/81)
Brookline (59,159)	William T. Griffiths Commissioner of Public Works 333 Washington St. 02146	mp, glass, cans, bulk, al	depot(np was curbside until 7/80)
Burlington (23,831)	-----	none	-----

* np- newspapers
mp- mixed papers
cc- corrugated cardboard
hg- high grade paper
glass- clear, green, and brown glass
cans- ferrous (steel) cans
bulk- bulk metal (white goods)
al- aluminum
leaf- leaf composting
none- no recycling
(disc- once recycled materials mentioned)

Community (population)	Contact person	Materials Recycled*	Recycling Depot or Curbside Collection
Cambridge (102,000)	-----	(disc-np, glass)	(np was curbside)
Canton (18,000)	Department of Public Works 828-3551	np, glass, al	depot
Carlisle (3,400)	Roger Davis P.O.Box 149	np, cc, glass, cans	depot
Chelmsford (32,000)	Harold Gray Highway Dept. Town Hall 01824	np (disc-glass, al)	curbside (glass, al were depot)
Chelsea (25,015)	-----	none	-----
Cohasset (7,800)	Kevin O'Brien Board of Health 383-1664	mp, glass	depot
Concord (17,000)	Winifred Ferguson Reusit, Inc. 100 Garfield Road	np, glass, bulk (disc-cc, cans, al)	depot
Danvers (24,069)	-----	(disc-np)	-----
Dedham (28,000)	Paul J. Sullivan Commissioner of Public Works 55 River St., 02026	np, glass, bulk	depot
Dover (4,800)	Selectmen's office 785-0054	mp, glass, cans	depot
Duxbury (13,000)	Paul A. Brogna 878 Tremont St. 02332	np, cc, glass, cans, bulk (disc-al)	depot
Essex (3,000)	Robert Wilson Town Hall 01929	bulk	depot
Everett (40,000)	Anne Singer Gina Gill 321-1210	np, mp, cc, hg, glass, al	depot- 203 Ferry Street Malden
Falmouth (22,000)	Virginia Valiela Box 237 North Falmouth 02556 563-9028	mp, hg, glass, cans, bulk, al, plastic milk jugs	depot
Foxborough (13,900)	Harriet Blomberg 19 Beach St.02035	np, glass, bulk, waste oil	depot
Framingham (70,000)	James E. Hanscom Director of Public Works Memorial Building 01701	np, glass, bulk, leaf	depot
Hamilton (6,797)	Wallace Lane Superintendent of Public Works 577 Bay Road 01936	(disc-np, glass, cans)	(was curbside)
Hanover (11,299)	Lawrence E. Slaney Chairman, Board of Health Town Hall 02339	np. cc, glass, bulk, leaf, motor oil	depot

Community (population)	Contact Person	Materials Recycles*	Recycling Depot or Curbside Collection
Harwich (10,000)	Board of Selectmen	np, cans, bulk, al (disc-plastic)	depot
Hingham (22,000)	Herbert A. Cole III 101 Hersey Street	np, glass, bulk	depot
Holbrook (12,000)	-----	none	-----
Holliston (13,100)	-----	none	-----
Hopkinton (7,044)	Jane Hinckley 157 Pond St.	np, cc, hg, bulk	depot
Hudson (17,000)	Mrs. John Gillis 19 Glendale Rd. 01749	(disc-glass)(was depot)	(was depot)
Hull (10,000)	-----	none	-----
Ipswich (12,000)	J. Chase J. Giancola South Main St. Annex 01938	(disc-np, cc, glass)	-----
Lexington (32,477)	Warren A. Empey Manager of Operations Public Works Bldg. 201 Bedford St. 02178	np, glass, (disc-leaf)	depot (was curbside
Lincoln (6,300)	Town Offices 259-8850	mp, glass	depot
Littleton (7,300)	Mona Glowacki Clerk, Board of Health Town Hall 01460	np, glass, bulk	depot
Lynn (82,000)	John R. Casey Commissioner of Public Works City Hall 01901	(disc-np)	-----
Lynnfield (12,051)	A. David Rodham Director of Public Works Town Hall 01940	mp, cc, hg, leaf (disc-cans, glass, al)	curbside
Malden (56,000)	Anne Singer Gina Gill 321-6151	np, mp, cc, hg, glass, al	depot- 203 Ferry St.
Marblehead (22,000)	Raymond A. Reed Director of Public Health P.O.Box 98 01945	mp, cc, glass cans, bulk, al	curbside
Marlborough (32,000)	Ronald Lafreniere Municipal Garage Neil St. 01752	cans, bulk	depot
Marshfield (22,000)	Donald Harrington Highway Division Department of Public Works	np. glass, bulk (disc-leaf)	depot
Maynard (10,000)	-----	none	-----
Medfield (10,500)	William E. McCarthy Superintendent Highway Dept. Town Hall 02052	np, cc, glass, bulk, leaf (disc-al)	depot

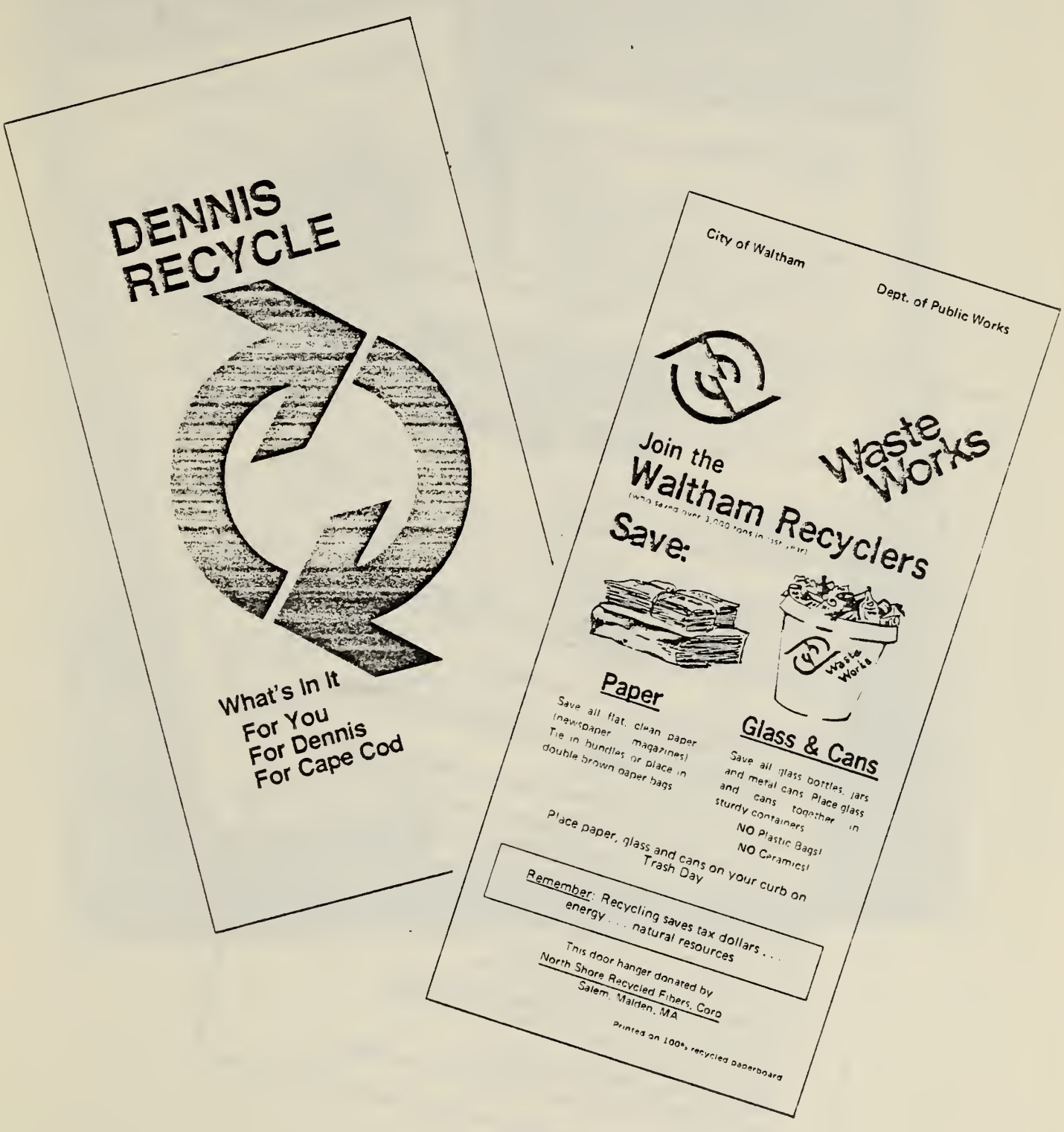
Community (population)	Contact Person	Materials Recycled*	Recycling Depot or Curbside Collection
Medford (61,000)	Anne Singer Gina Gill 321-6151	np, mp, cc, hg, glass, al	depot- 203 Ferry St. Malden
Medway (8,600)	D. Higgins 155 Village St.	mp, bulk (disc-leaf)	depot
Melrose (32,000)	Anne Singer Gina Gill 321-6151	np, mp, cc, hg, glass, al	depot 203 Ferry St. Malden
Millbury (12,500)	-----	none	-----
Millis (6,900)	Robert Leslie Superintendent of Public Works 7 Water St. 02054	np. glass, bulk	depot
Milton (26,700)	Lawrence W. DeCelle, Jr. Director of Public Works 525 Canton Ave.02181	mp, cc, hg, glass, cans, bulk, al, leaf	depot
Nahant (4,000)	F. Thom. Donahue Director of Public Works Town Hall 01908	(disc-glass)	-----
Natick (31,000)	George Rogers 111 West Central St. 01760	np, bulk, al, leaf, tires	depot
Needham (30,000)	Robert J. Lannigan Highway Superintendent 470 Dedham Ave. 02192	np, glass, cans, bulk, al leaf	depot
Newton (85,000)	Betsy Lewenberg 24 Hancock St 02166 332-3671	np, glass, cans, bulk, al (disc-leaf)	curbside
North Brookfield (4,400)	Donald J. Gilette Town Hall Main Street	mp, cc, glass, cans, bulk	depot
North Reading (12,000)	-----	none	-----
Norwell (9,000)	-----	none	-----
Norwood (30,000)	Bernard Cooper Assistant Town Manager 566 Washington St. 02062	(disc-np, cc, glass, cans, bulk, al, tires)	-----
Orleans (5,464)	Selectmen Town Offices	np, glass, cans, bulk, al	depot
Peabody (48,000)	Kevin Marston Dept. of Public Services Berry Street 01960	(disc-glass)	-----
Pembroke (13,000)	Board of Health Center St. 02359	np (disc-glass)	depot

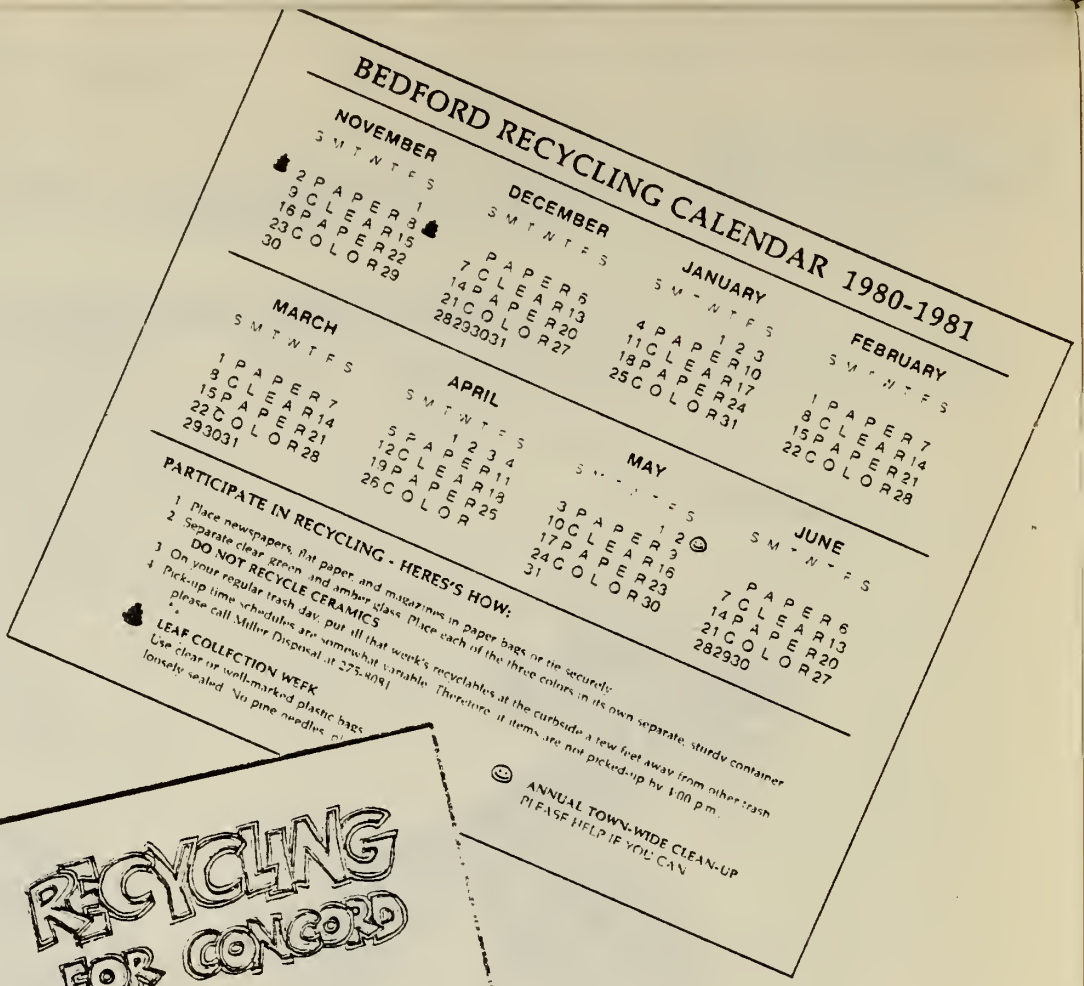
Community (population)	Contact Person	Materials Recycled*	Recycling Depot or Curbside Collection
Provincetown (4,000)	Landfill Custodian c/o Health Agent Sanitation Dept.	cans, bulk, al, leaf	depot
Quincy (91,000)	-----	none	-----
Randolph (29,000)	-----	none	-----
Raynham (9,000)	Edward Murby 1555 King Phillip St. 02767	glass, bulk, al (disc-np. leaf)	depot
Reading (24,000)	E. Roger Louanis Dept. of Public Works 16 Lowell St 01867	np, glass, cans, bulk, al, leaf	depot
Revere (41,000)	-----	none	-----
Rockport (6,500)	Ann Fisk 8 Pasture Rd. 01966 546-2789	mp, glass, bulk, leaf, motor oil (disc-cans, cc)	depot
Salem (38,800)	A.V. Fletcher, P.E. Director, Public Services One Salem Green 01970	bulk, leaf (disc-mp, cc, hg)	(papers were curbside)
Saugus (25,000)	-----	none	-----
Sherborn (4,200)	Mike Perlmutter Recycling Committee Town Hall 01770	np, glass (no brown), (disc-cans, bulk)	depot
Scituate (18,000)	Kenneth Bates Sewer Division 161 Driftway 02066	np, cc, glass, bulk, al, oil, tires	depot
Sharon (13,000)	Roberta Pitchell 87 Lakeview St 02067 784-5932	np, glass, cans, leaf	depot
Shrewsbury ( )	Robert P. Jacques 100 Maple Ave 01545	bulk	depot
Somerville (81,000)	-----	(disc-np, glass, cans)	(was curbside)
Stoneham (22,500)	William J. Reid Dept. of Public Works 16 Pine St. 02181	bulk	depot
Stoughton (27,000)	James Williams Dept. of Public Works 10 Pearl St 02072 344-2112	(disc-np, glass, cans)	(was curbside)
Stow (5,200)	Aaron M. Taub Chairman Board of Health P.O.Box 277 01775	mp.cc	depot
Sudbury (14,726)	Highway Dept. 175 Old Lancaster Rd. 01776 443-2209	mp, glass, bulk	depot

Community (population)	Contact Person	Materials Recycled*	Recycling Depot or Curbside Collection
Topsfield (6,000)	Dorothy T. Wass 178 High St 01983	np, cc, glass, cans, al	depot
Wakefield (25,000)	Richard Boutiette Director, Dept. of Public Works 1 Lafayette St 01880	bulk, leaf (disc-np)	curbside for bulk
Walpole (18,500)	Peter Boghossian Town Hall 02081	cans, bulk	depot
Waltham (57,000)	Marianne Lynnworth 77 Graymore Rd.02154 894-2309	np.cc, bulk, leaf (disc-glass,cans,al)	curbside
Watertown (35,000)	Joan Singer Board of Health Administration Bldg. Main Street 02172 924-6960	np, glass, cans (beginning 7/81)	depot
Wayland (13,000)	Harry Williams Superintendent Highway Dept. 358-7701	mp, glass, cans, motor oil	depot
Wellesley (28,000)	Charles Kiley Dept. of Public Works 169 Great Plain Ave 02181 235-7600	np, mp, cc, hg, glass, cans,bulk, al, leaf, plastic, waste oil, etc.	depot
Weston (11,000)	Mabel Patterson 9 Skating Pond Rd. 02193 899-1643	np, mp, cc, glass, cans, al, bulk, waste oil, leaf	depot
Westwood (14,000)	Shirley Heywood 1007 High St 02090	np, (disc-glass)	depot
Weymouth (56,000)	Frank S. Lagrotteria Director, Public Works 120 Winter St 02188	mp,cc,hg,leaf	curbside for paper
Winchester (21,385)	Andrew J. Connolly 175 R Swanton St 01890	mp, hg, glass,cans, bulk, al, leaf, tires	depot
Woburn (35,000)	Edwin Walker 13R Church Ave 01801	(disc-np)	-----
Wrentham (7,200)	Everett W. Skinner,Jr. Dept. of Public Works Taunton St. 02093	mp, cc, hg,(disc-cans,al)	depot
Yarmouth (19,000)	Peter G. Homer Town Hall South Yarmouth 02664	np,glass, cans, bulk, al, waste oil	depot

APPENDIX D

SAMPLE PUBLIC EDUCATION ITEMS


DENNIS
RECYCLE
What's In It
For You
For Dennis
For Cape Cod
City of Waltham
Dept. of Public Works
Waste Works
Join the
Waltham Recyclers
Save:
Paper
Save all flat, clean paper (newspaper, magazines) Tie in bundles or place in double brown paper bags
Glass & Cans
Save all glass bottles, jars and metal cans. Place glass and cans together in sturdy containers
NO Plastic Bags!
NO Ceramics!
Place paper, glass and cans on your curb on Trash Day
Remember: Recycling saves tax dollars . . . energy . . . natural resources
This door hanger donated by
North Shore Recycled Fibers, Corp
Salem, Malden, MA
Printed on 100% recycled paperboard



BEDFORD RECYCLING CALENDAR 1980-1981

NOVEMBER
S M T W T F S
2 PAPER 1
3 CLEAR 8
16 PAPER 15
23 COLOR 22
30 29

DECEMBER
S M T W T F S
PAPER 6
7 CLEAR 13
14 PAPER 20
21 COLOR 27
28 29 30 31

JANUARY
S M T W T F S
4 PAPER 1 2 3
11 CLEAR 10
18 PAPER 17
25 COLOR 24 31

FEBRUARY
S M T W T F S
1 PAPER 7
8 CLEAR 14
15 PAPER 21
22 COLOR 28

MARCH
S M T W T F S
1 PAPER 7
8 CLEAR 14
15 PAPER 21
22 COLOR 28
29 30 31

APRIL
S M T W T F S
1 2 3 4
5 PAPER 11
12 CLEAR 18
19 PAPER 25
26 COLOR

MAY
S M T W T F S
3 PAPER 1 2
10 CLEAR 9
17 PAPER 16
24 COLOR 23
31 30

JUNE
S M T W T F S
PAPER 6
7 CLEAR 13
14 PAPER 20
21 COLOR 27
28 29 30

PARTICIPATE IN RECYCLING - HERE'S HOW:

1. Place newspapers, flat paper, and magazines in paper bags or tie securely.
2. Separate clear, green and amber glass. Place each of the three colors in its own separate, sturdy container.
   DO NOT RECYCLE CERAMICS
3. On your regular trash day, put all that week's recyclables at the curbside a few feet away from other trash.
4. Pick-up time schedules are somewhat variable. Therefore, if items are not picked-up by 1:00 p.m. please call Miller Disposal at 275-4091.

LEAF COLLECTION WEEK
Use clear or well-marked plastic bags
loosely sealed. No pine needles

ANNUAL TOWN-WIDE CLEAN-UP
PLEASE HELP IF YOU CAN

RECYCLING FOR CONCORD

Last year we collected
Paper 303 Tons (every ton saves 17 trees)
Glass 150 Tons (reuse saves energy)
Cans 24 Tons (reuse saves energy)

Yet this is only a small percentage of the available recyclable material in Concord.

Let's talk about facts.

1. *Are there benefits in recycling?*
   Yes, the program has a two-fold purpose in reusing materials to save our natural resources and removing large quantities of material from our landfill operation, thus extending its life.
2. *Does recycling require a lot of work?*
   Some work, yes; a lot, no. All you have to do is follow the instructions of rinsing out the glass containers and flattening cans, then put each recyclable in its own container instead of the trash can. Separating recyclables results in a more efficient use of space in your trash storage area; reduced volume can mean fewer trips to the dump.
3. *Does recycling take more time?*
   Yes, it takes a few minutes a day. However, you will find it can become a regular part of the household routine and that the benefits are worth the extra time and effort.
4. *Does recycling cost the town money?*
   No, it actually saves money. Because all recycled items are trucked to businesses for reuse, less room is required at the dump. This is translated into tax savings for you since the town can postpone acquisition of a new dump site.
5. *How many people in Concord actually recycle?*
   Based on surveys taken at the dump, from 20 - 25% of Concord residents participate in the recycling program.
6. *How are the profits from the sale of recyclables spent?*
   Concord's recycling group, REUSIT, channels the profits into ecological projects, such as:
   — Nearly $1000 for resodding ballfield at Emerson playground
   — $700 to remove unsightly foundation on Quirk Conservation Land on White Pond
   — Help "recycle" old cow barn at Correctional Institute in West Concord
   — $250 to Concord Middle School river study project
   — $200 for environmental books at town libraries
   — About $400 for Great Meadows nature program for all 5th graders
   — $1800 for "Walkways" at Recycle Center
   — Training of volunteers for 4th grade Town Forest nature study
   — $1000 for Beiknap House — Concord Alternative Residence, Inc.
   — Financial support for Conservation Law Foundation of N.E.
   — Financial support of five year long monthly water testing of Concord's waterways
   — Camera for Department of Natural Resources to promote use of conservation lands
   — Organization of annual town cleanups
   — Support for Environmental Resource Center at main library
   — Support for printing directory of local environmental organizations

If you think these and similar projects are worthy of continued support, WHY NOT RECYCLE?

TO ALL NEWTON RESIDENTS

DON'T THROW IT AWAY – RECYCLE IT AWAY

Last year Newton spent over $700,000 to throw our trash away. Approximately 35% of this trash can be recycled. When we recycle, we not only save money by not throwing valuable rubbish away, but we also earn back money for our city.

Help reduce the cost of trash disposal by recycling. You will also help conserve energy and natural resources and reduce environmental pollution and waste.

NEWTON RECYCLING PROGRAM

This publication is printed on 100% recycled paper. No trees were destroyed to produce this paper.

RECYCLING INSTRUCTIONS

Glass:

1. Save all bottles and jars.
2. There is no need to wash glass, remove labels or remove rings.
3. Separate clear glass from colored glass and place in separate containers.
4. Please **do not** recycle light bulbs, china, ceramics or pottery. Inclusion of any of these items will make tons of collected glass and cans unacceptable for recycling.

Cans:

1. **Save all metal cans** – Cans include steel, tin and aluminum cans. They also include aluminum foil, pie and cake tins, TV dinner tins and metal bottle tops.
2. There is no need to wash, or remove labels, or flatten cans.

Cans should be mixed with either clear or colored glass.

Paper:

Save all newspapers, magazines, and phone books. Papers must be tied in bundles no larger than 2 feet high or placed securely in **double brown** grocery bags.

Containers:

Only plastic or metal containers.

Use containers with a white horizontal stripe.

Clear glass and colored glass must be put in separate containers.

Bottles placed in plastic bags and cardboard boxes **will not** be collected for recycling.

Items placed in striped recycling containers **will not** be collected.

Containers for recycling are collected **each week** on your trash day. They must be at the curb by 7 a.m.

Place boxed or bagged papers and marked recycling containers at the curbside **3 or 4 feet** to one side of your trash.

Call 552-7220 or 552-7221 with any questions, complaints or compliments.

Notice of Public Meeting to Discuss Recycling

THE MAYOR'S ADVISORY COMMITTEE ON RECYCLING
WANTS YOU TO KNOW
ABOUT THE PROPOSED ORDINANCE REVISIONS CONCERNING NEWSPAPER RECYCLING

WHY the proposed changes?
-To increase citizen participation in newspaper recycling which can mean as much as $41,000 savings annually to Newton.
-Newton currently receives $15 per ton for newspaper.
- Newton saves $18.50 per ton in transfer haul costs by not hauling papers with trash.
-Increased participation adds no additional costs.
- Newspaper recycling brings ecologic benefits by:
* saving rapidly decreasing landfill space
* saving 17 trees per ton of newspaper
* saving energy

HOW will the proposed ordinance revisions affect your use of newspaper?
- You would still be able to use newspapers to:
* wrap garbage * burn in stoves and fire
* train pets * use for hobby and household
* give to newspaper drives
- You would not be able to dispose of clean n
newspapers with other trash.
- You would simply "bag" them in double
them into bundles for separate collect

THIS ORDINANCE IS DESIGNED TO INCREASE
RECYCLING, AND PLUS REVENUES. FOR NEW
EASY UNDER THE PROPOSED ORDINANCE CH

PLEASE LEND YOUR
AT THE MEETING

Press Release

THE NEWTON RECYCLING PROGRAM

FOR IMMEDIATE RELEASE

Contact
Betsy Lewenberg
925-0905

Coming soon – the September 1990-December 1991 Newton Recycling Program calendar and newsletter. Learn how your trash can become cash. Find out when to put your recyclables at curbside and how easy it is to prepare them for recycling. The Newton Recycling Newsletter and calendar will be delivered to Newton residents in early September.

Please note that newspapers only will be collected the week of September 1 for all Newton residents. There will be no glass/can collection during that week.

# # # #

DPW · City Hall · 1000 Commonwealth Avenue, Newton, MA 02159

APPENDIX E

RECYCLING COMMUNITY PROFILES

COMMUNITY: ANDOVER
POPULATION: 27,000
REFUSE DISPOSAL METHOD: Weekly curbside pickup by private hauler under contract with town. Trash is hauled to out-of-town landfill.

MATERIALS RECYCLED: Newspaper, magazines, corrugated cardboard, glass.

MECHANICS OF RECYCLING: Biweekly collection of all recyclables on regular trash collection day. Newspapers and magazines must tied or placed in grocery bags; corrugated cardboard must be collapsed and tied, and clear, green, and brown glass must be placed in separate reusable containers or large grocery bags.

Recyclables are collected by a truck pulling a trailer. Paper and cardboard go into the truck and the separated glass goes into the compartmented trailer. Andover Recycling pays a trucker a fixed amount to collect and haul the recyclables to the purchaser; revenues from the sale of the materials go directly to the committee.

RECYCLING AUTHORITY: Program is operated by Andover Recycling, Incorporated, a nonprofit organization. Approximately half of the funding comes from the Public Works Department, with recycling revenues accounting for most of the remainder.

RECYCLING HISTORY: In 1970, a recycling depot was established at the town landfill. At this time, Andover did not provide trash collection; residents brought their rubbish to the town dump. In 1972, curbside collection of glass, cans and paper was instituted by the community as a result of an affirmative vote at town meeting. At the same time, Andover began curbside collection of refuse. Both are collected by private contractors. Curbside recycling collection included paper, glass and cans. In 1979, Andover Recycling, Incorporated was formed as a nonprofit organization to oversee recycling operations. Although the same group has, in effect, been running the recycling program since its inception, the corporation was formed to simplify the recycling process by removing the town from active participation in hiring contractors, thereby eliminating the need to follow restrictive municipal bidding requirements. At the same time, a new contractor was hired to collect recyclables (the third used by Andover) and can collection was discontinued due to marketing problems.

RECOVERY RATE: paper 42%
glass 13%

PUBLICITY: annual mailing of calendar/schedule

annual recycling auction

several press releases per month

school programs (approximately every other year)

occasional posters and contests

signs placed in town telling which recyclables are collected that week

ANDOVER

ANNUAL RECYCLING COSTS AND SAVINGS

Year	Recycled Material	Tons Recycled	Revenues ($)	Total Operating Costs ($)*	Net Cost Per Ton ($)**
FY'80	Paper	833	13,780	-	-
	Glass	279	2,793	-	-
	All Recyclables	1,113	16,781	31,822	8.07
FY'79	Paper	728	6,323	-	-
	Glass	335	3,345	-	-
	All Recyclables	1,063	9,669	34,560	23.44
FY'78	Paper	765	11,386	-	-
	Glass	353	3,961	-	-
	All Recyclables	1,118	15,347	34,560	17.19
FY'77	Paper	815	12,899	-	-
	Glass	148	1,972	-	-
	All Recyclables	1,266	18,698	27,500	6.95
FY'76	Paper	814	10,623	-	-
	Glass	281	3,963	-	-
	All Recyclables	1,151	15,461	25,000	8.29
FY'75	Paper	728	3,812	-	-
	Glass	404	4,032	-	-
	All Recyclables	1,189	8,782	25,000	13.64
FY'74	Paper	775	16,289	-	-
	Glass	384	1,694	-	-
	All Recyclables	1,243	18,041	25,000	5.60

*Operating costs are primarily the contract cost of collecting the recyclables plus approximately $1,500 per year for the recycling brochure and other incidential expenses.

**Net cost per ton is calculated as follows: Subtract the income received from the contract cost and divide this figure by the number of tons recycled. This can then be compared to the disposal cost per ton.

COMMUNITY: HANOVER
POPULATION: 11,300
REFUSE DISPOSAL: Refuse must be brought to the town transfer station (no municipal collection provided). Trash is hauled out of town.

MATERIALS RECYCLED: Newspapers, corrugated cardboard, glass, bulk metal, used motor oil, leaves (compost).

MECHANICS OF RECYCLING: Residents bring recyclables to transfer station and place them in appropriate 55-gallon steel drums. (Glass must be separated by colors.) Town worker empties full drums into a front-end loader which deposits glass into a glass crusher which chops up the glass. The glass crusher is located on top of the appropriate section of the partitioned town-owned, roll-off container, so that crushed glass falls into the proper section. When the container is full, the trucker takes the glass and pays Hanover the revenues (at the 1981 rate of $22 per ton). Hanover pays the trucker $100 per trip (also 1981). Hanover has a weighing station to determine tonnage. Newspapers and corrugated cardboard are compacted into containers provided by the trucker. The town pays $40 per trip for paper and cardboard (1981 prices).

RECYCLING AUTHORITY: Board of Health

RECYCLING HISTORY: In the early 1970s, Hanover ran out of landfill space and established a transfer station for compacting trash to be hauled out of town. The Board of Health established the recycling program at this time as a method of diverting some waste, thereby avoiding some hauling fees as well as bringing in revenues from the sale of these materials. The program has remained basically the same, with some equipment purchases over the years. A glass crusher was purchased in the early years of the program. More recently, Hanover bought two paper compactors and a roll-off container which is partitioned into three sections for glass.

RECOVERY RATE: paper 44%
flass 9%

PUBLIC EDUCATION: signs at transfer station
occasional flyers
occasional information in newspapers
employees at transfer station talking to residents to encourage recycling.

HANOVER

ANNUAL RECYCLING COSTS AND SAVINGS

Year	Recycled Material	Tons Recycled	Revenues ($)	Avoided Disposal Costs ($)*	Total $ Benefit	Total Operating Costs ($)	Net Savings ($)
1980	Paper	330	4,993	4,320	9,313	minimal**	9,313
	Glass	67	1,458	877	2,335	"	2,335
	Combined	397	6,451	5,197	11,648	"	11,648
1979	Paper	376	6,925	4,316	11,241	"	11,241
	Glass	88	1,933	1,010	2,943	"	2,943
	Combined	464	8,858	5,326	14,184	"	14,184
1978	Paper	370	7,313	3,852	11,165	"	11,165
	Glass	102	2,087	1,062	3,149	"	3,149
	Combined	472	9,400	4,914	14,314	"	14,314
1977	Paper	283	8,374	2,853	11,227	"	11,227
	Glass	112	2,133	1,129	3,262	"	3,262
	Combined	395	10,507	3,982	14,489	"	14,489
1976	Paper	283	5,658	2,714	8,372	"	8,372
	Glass	112	2,128	1,074	3,202	"	3,202
	Combined	395	7,786	3,788	11,574	"	11,574
1975	Paper	318	1,148	2,805	3,953	"	3,953
1974	Paper	225	5,855	1,631	7,486	"	7,486
1973	Paper	228	2,286	1,596	3,882	"	3,882

*Avoided disposal costs are based upon tonnage recycled multiplied by the cost of disposing of a ton of refuse. The cost is as follows: 1980, $13.09; 1979, $11.48; 1978, $10.41; 1977, $10.08; 1976, $9.59; 1975, $8.82; 1974, $7.25; 1973, $7.00.

**The reasons that Hanover's costs are minimal is that Hanover's recycling operation is extremely efficient. No monitor is necessary since the recycling containers are merely a few steps away from the trash pit and transfer station. Any other costs, including bookkeeping, are handled as a small part of the overall public works budget and cannot be separated. Capital costs incurred during this period include: 1979 replace seals on compacter - $849; 1976 purchase two compactors (for newspaper and corrugated) - $9,000; 1976 purchase one glass crusher - $1,875; 1975 purchase one glass container (40 cu.yd., open-top, roll-off) - $1,900.

COMMUNITY: NEWTON
POPULATION: 85,000
REFUSE DISPOSAL METHOD: Weekly municipally-operated curbside pickup. Trash is hauled from local transfer tation to out of town landfill.

MATERIALS RECYCLED: Newspaper, glass, cans, bulk metals.

MECHANICS OF RECYCLING: Newspapers are collected each week on a regular trash day. They must be placed at curbside tied in bundles or placed in double brown grocery bags. Clear glass and cans are collected on the first or second week of the month on regular trash day, according to a calendar sent to households. Colored glass and mixed cans are collected on the third or fourth week of the month on regular trash day, according to the same calendar. Newspaper recycling is mandatory; participation in the glass/can program is voluntary.

Three trucks with two men each are used to collect recyclables: two for newspaper, and one for glass/cans.

RECYCLING AUTHORITY: Program is operated by the Public Works Department. A consultant hired by the DPW is in charge of community education as well as recommending program modifications. The Mayor's Advisory Committee on Recycling works with the consultant to help promote the recycling program.

RECYCLING HISTORY: In 1972, monthly newspaper curbside collection was initiated and depots were established for glass and cans through the efforts of a volunteer working for the Board of Aldermen. The voluntary program for newspaper collection was established by an ordinance passed by the Board of Aldermen. Collection dates for newspaper varied according to neighborhoods. Because of the complicated routing system, publicity was difficult and tonnage recycled was less than hoped for. In 1975, an ordinance was passed by the Board of Aldermen establishing a program for weekly collection of glass and cans. At the same time, newspaper collection was changed from monthly to weekly. The impetus for the mandatory ordinance came from the Mayor's Advisory Committee on Recycling, and the League of Women Voters. In 1980, glass/can collection was reduced to the present twice-per-month system as a result of low tonnage recycled and unfavorable economics which were aggravated by collection and marketing problems. The program cutback eliminated one truck and two men, reducing annual costs by $25,000. The newspaper program was left intact. In 1981, newspaper recycling became mandatory. This change was made for economic reasons. Tonnage recycled had reached a plateau, as revenues dropped (due to unfavorable market conditions) and collection costs rose. After passage of the ordinance, tons recycled nearly doubled and the program is now profitable. The impetus for the mandatory and the League of Women Voters."

RECOVERY RATES: paper 26%
glass/cans 7%

PUBLIC EDUCATION: brochures/calendars distributed to households

press releases every 3-4 weeks

programs in scholls

recycling booth at two city fairs each year

dissemination of information via community and church groups

occasional contests

NEWTON

ANNUAL RECYCLING COSTS AND SAVINGS

Year	Recycled Material	Tons Recycled	Revenues ($)	Avoided Disposal Costs ($)*	Total $ Benefit	Total Operating Costs ($)	Net Savings ($)
1980	Paper	1,684	26,313	29,807	56,120	61,331	-5,211
	Glass/Cans	(600)	(4,800)	(10,620)	(15,420)	30,104	(-14,684)
	Combined	(2,284)	(31,120)	(40,427)	(71,540)	91,435***	(-19,895)
1979	Paper	1,932	9,096	31,793	40,889	52,260	-11,371
	Glass/Cans	489****	3,156	13,331	16,487	48,070	-31,583
	Combined	2,421	12,252	45,124	57,376	100,330	-42,954
1978	Paper	1,909	15,843	29,365	45,208	48,412	-3,204
	Glass/Cans	494****	2,470	12,453	14,923	50,299⊕	-35,376
	Combined	2,403	18,313	41,818	60,131	98,711	-38,580
1977	Paper	1,765	18,655	25,316	43,971	48,056	-4,085
	Glass/Cans	523****	3,963	10,222	14,185	63,617	-49,432
	Combined	2,288	22,618	35,538	58,156	111,673	-53,517
1976	Paper	1,665	24,496	22,155	46,651	46,664	-13
	Glass/Cans	439	5,182	6,893	12,075	50,671	-38,596
	Combined	2,104	29,678	29,048	58,726	97,335	-38,609
1975	Paper	1,344	7,292	n.a.⊛	n.a.	35,889	n.a.
1974	Paper	1,376	33,796	n.a.	n.a.	23,965	n.a.
1973	Paper	1,516	16,284	n.a.	n.a.	22,710	n.a.
1972	Paper	1,141	8,492	n.a.	n.a.	15,813	n.a.

Note that estimated costs are shown in ().

*Avoided disposal costs are based upon tonnage recycled multiplied by the cost to dispose of one ton of refuse. The cost for the fiscal years 1976-1981 is as follows: 1976, $12.83; 1977, $13.83; 1978, $14.84; 1979, $15.92; 1980, $17.16; 1981, $18.44.

**Collection costs represent solely labor costs of collecting recyclables. Neither fringe benefits nor truck operation and maintenance costs are included in these figures.

***Collection costs dropped in 1980 because one truck with two men was eliminated from recycling pickup.

****The tonnages listed above reflect the tonnages that Newton received payment for. The actual tonnages collected (but lost due to collection problems or rejection by the purchaser) were: 1979 - 812; 1978-812; 1977 - 709.

⊕In 1978 one man was eliminated from each of the two glass/can recycling crews (reducing the crew from 3 men to 2), reducing collection costs.

⊛Newton incinerated its refuse prior to 1976. Cost per ton figures are not available.

COMMUNITY: ROCKPORT
POPULATION: 6,500
REFUSE DISPOSAL METHOD: community landfill

MATERIALS RECYCLED: mixed papers, glass, bulk metal, used motor oil, leaves (compost)

MECHANICS OF RECYCLING: Residents bring recyclables to landfill and place in appropriate areas. Color-sorted glass is deposited into wooden crates in a tractor trailer. Monitor is responsible for breaking up glass with a movable glass crusher that is placed on top of 55-gallon steel drums which are located along the wall of the trailer. The trailer has a door that can be locked, minimizing vandalism problems. Glass is picked up by David White once per month. Rockport is paid $2 per 55-gallon drum (each holds approximately 500-600 pounds, but it is not weighed). Paper is deposited in containers provided by Suffolk Services (Shaeffer). The price per ton received for paper reflects the fact that Suffolk Services provides both container and hauling. Prices fluctuate with market changes. Rockport also has a Swap Shop -- a wooden shed (constructed by high school students) where items no longer wanted can be left for someone else to "reposses". Among items found in the Swap Shop are clothes, skates, dishes, small appliances, furniture, ets.

RECYCLING AUTHORITY: Rockport Recycling Committee

RECYCLING HISTORY: In 1968, newspaper recycling was initiated at town dump by Ann Fisk, who was a member of the Board of Selectmen at the time. In 1973, recycling operation was expanded to include glass and cans. Ann Fisk and the recycling committee purchased a glass crusher and a tractor trailer for glass and can recycling with funds donated by local organizations and proceeds from a rummage sale. Can recycling was discontinued in the late 1970's when MATCON, the glass and can buyer, went out of business. The Rockport Recycling Committee, headed by Ann Fisk, has had the primary responsibility for the recycling program, although working with the public works department. Equipment has been purchased through revenues from the sale of recyclables as well as funds raised by the recycling committee. The town had provided $1,000 per year for a part-time monitor, but this was cut out of the budget this year as a result of Proposition 2½.

Moneys from the sale of recyclables have been used for tree planting by the committee. More recently the revenues have been given to the public works department for tree plantings. In 1978, $1,200 was given to the public works department and in 1981, $1,000 was given for park and tree maintenance to help offset the effects of Proposition 2½. The committee is now saving its revenues to build a new recycling center in the transfer station which will be built in the not too distant future. Recycling revenues will also be used to pay for a monitor.

RECOVERY RATE: paper 31%
glass 9%

PUBLIC EDUCATION: signs at landfill area
sporadic distribution of flyers at town meetings
also sporadic newspaper publicity and education
in school ecology classes.

ROCKPORT

ANNUAL RECYCLING COSTS AND SAVINGS

Year	Recycled Material	Tons Recycled	Revenues ($)	Avoided Disposal Costs ($)*	Total $ Benefit	Total Operating Costs ($)**	Net Savings ($)
1980	Paper	117	2,146	1,580	3,726	-	-
	Glass	38	307	513	820	-	-
	Combined	155	2,453	2,093	4,546	1,000	3,546
1979	Paper	170	660	2,210	2,870	-	-
	Glass	50	200	650	850	-	-
	Combined	220	860	2,860	3,720	1,275	2,445
1978	Paper	111	699	1,443	2,142	-	-
	Glass	45	282	585	867	-	-
	Combined	156	981	2,028	3,009	1,300	1,709
1977	Paper	113	1,184	1,413	2,597	-	-
	Glass	16	93	200	293	-	-
	Combined	134	1,277	1,613	2,890	1,315	1,575
1976	Paper	107	1,597	1,284	2,881	-	-
	Glass	40	230	480	710	-	-
	Combined	147	1,827	1,764	3,591	1,723***	1,868
1975	Paper	114	572	1,311	1,883	-	-
	Glass	30	64	405	469	-	-
	Combined	144	636	1,716	2,352	1,614***	738
1974	Paper	116	1,544	1,276	2,820	-	-
	Glass	25	146	275	421	-	-
	Combined	141	1,690	1,551	3,241	1,783***	1,458

*Avoided dumping costs are based on tonnage recycled multiplied by the cost of disposing of a ton of refuse. Rockport's costs were: 1980, $13.50; 1979, $13.00; 1978, $13.00; 1977, $12.50; 1976, $12.00; 1975, $11.50; 1974, $11.00.
**Operating costs are almost exclusively the costs for monitoring the recycling center. Capital costs included: 1974 tractor trailer - $600, glass crusher - $600; 1980 glass crusher - $1,200.
****Higher operation costs during these years is a result of paper drives, which were subsequently discontinued due to higher costs.

COMMUNITY: WELLESLEY
POPULATION: 28,000
REFUSE DISPOSAL METHOD: Refuse must be brought to town recycling center/transfer station. No municipal collection is provided, Trash is hauled out of town.

MATERIALS RECYCLED: newspapers, mixed papers, corrugated cardboard. high-grade paper, glass, cans, bulk metal, aluminum, leaves (compost), waste motor oil, batteries, milk cartons. Also contains a used-book exchange and Salvation Army dumpsters.

MECHANICS OF RECYCLING: Residents bring materials to recycling center and place in appropriate containers. Color-sorted glass is placed in divided 40 cubic yard, open-top, roll-off containers owned by Wellesley, which the town hauls to the buyers when full. Paper is divided into various grades (newspaper, mixed paper, corrugated, bags, milk cartons, etc.) and placed in separate containers. It is then baled and sold to various markets. Cans, both steel and aluminum, are deposited into a hopper of a magnetic separating machine. Steel is magnetically pulled from the aluminum and deposited into a 35-gallon barrel which is emptied into a 30-yard container when full. Wellesley trucks the steel to the Babcock Company in Worcester. The aluminum is flattened and blown into a 30-yard container. When the container is full, the aluminum is hauled to Container Recovery Corporation in Nashua, New Hampshire. Various markets accept the other recyclables.

RECYCLING AUTHORITY: Sanitation Division, Department of Public Works

RECYCLING HISTORY: In 1971, the recycling center was established behind the town incinerator due to the efforts of Martha Stone and the Action for Ecology group. The recycling operation was run by committee volunteers for the first year. In 1972, the Public Works Department hired Charles Kiley as full time recycling attendant. Recycling began with glass, cans and paper, using 55-gallon drums as containers, and gradually became more sophisticated. Now a wide range of materials are recycled, using town-owned equipment (including balers and an industry-donated magnetic separator).

The Wellesley recycling program has been used as a model for recycling programs nationwide. Its success can be attributed to an active group of dedicated, conscientious volunteers who initiated the program, followed by the town's hiring of Charles Kiley, a committed, hardworking and innovative recycling attendant who worked his way up to Division Supervisor. He, in turn, hired dedicated and competent people to work for him. As a result of the efforts of the Public Works Department, the Action for Ecology group and the cooperation of the citizenry, Wellesley's recycling program has been a success. Its success can also be attributed to the constant modifications and innovations that Mr. Kiley makes in his operation.

15,000 tons of refuse material has been recycled in Wellesley since its program began over ten years ago--more trash than the community generates in one year!

RECOVERY RATE: paper 30%
glass 15%

PUBLIC EDUCATION: signs at recycling center/trash disposal facility facility; articles in local newspaper at least monthly; publications in various magazines;

school programs and field trips to recycling area, in early years of program, brochures were printed annually and sent out in electric bills

WELLESLEY

ANNUAL RECYCLING COSTS AND SAVINGS

Year	Recycled Material	Tons Recycled	Revenues ($)	Avoided Disposal Costs ($)	Total $ Benefit	Total Operating Costs ($)	Net Savings ($)
1980	Newspaper	628	18,719	15,696	34,415	-	-
	Glass	335	9,758	8,363	18,121	-	-
	All Recyclables	1,501	42,474	37,537	80,011	15,000	65,011
1979	Newspaper	607	12,155	15,291	27,446	-	-
	Glass	358	9,284	8,000	17,284	-	-
	All Recyclables	n.a.	n.a.	n.a.	n.a.	15,000	n.a.

Note that tonnage figures only are available for newspaper and glass from 1971-1978. The amounts recycled are as follows:

	1971	1972	1973	1974	1975	1976	1977	1978
Newspaper	460	628	724	732	370	600	566	506
Glass	245	326	372	433	296	310	388	328